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14. ABSTRACT *(Maximum 200 words)*:

Five working papers dealing with design specification for (MPT)2: Product 1, System performance requirements estimation aid; Product 2, Manpower constraints estimation and design specifications; Product 3, Personnel constraints estimation aid design specifications; Product 5, Manpower determination aid; and Product 6, Personnel requirements estimation and design specifications.

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Micro Analysis and Design, and Dynamics Research Corporation (1988). Product 2: Manpower constraints estimation and design specifications. WP MSG 88-06.

Micro Analysis and Design, and Dynamics Research Corporation (1988). Product 3: Personnel constraints estimation aid design specifications. WP MSG 88-07.

Micro Analysis and Design, and Dynamics Research Corporation (1988). Product 6: Personnel requirements estimation and design specifications. WP MSG 88-09.

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DESIGN SPECIFICATION FOR (MPT)2 PRODUCT 5

MANPOWER DETERMINATION AID

VOLUME I

Prepared By:

Micro Analysis and Design
and
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1 January 1988

ari

PRODUCT 5

MANPOWER DETERMINATION AID

SOFTWARE SPECIFICATION

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30 December 1987

PRODUCT 5:   MANPOWER DETERMINATION AID

CONTENTS

CONTENTS (continued)

PRODUCT 5:   MANPOWER DETERMINATION AID

CONTENTS (continued)

PRODUCT 5: MANPOWER DETERMINATION AID

SECTION 1 - INTRODUCTION

1.1 OBJECTIVE OF PAPER

This paper contains the software design specifications for an aid for systematically estimating manpower requirements for Army weapon systems following the initial detailed interface design but prior to the decision to fund the hardware/software prototype. The Manpower Determination Aid (MDA) is one of six products being developed in the Army Research Institute's (ARI) Manpower, Personnel, and Training aids for the MANPRINT integration (MPT)^2 project.

The design specification describes requirements for this aid, and presents a detailed description of the aid's steps and the techniques for developing them. It also delineates the software design.

This design specification is the second step in a three-step development process. The first step was to develop a concept paper describing the functionality of the MDA in concept. In this second step, detailed design specifications have been developed. In the third step, software, documentation, and training for the aid will be produced and demonstrated.

NOTE: IT IS NOT THE INTENTION OF THIS SPECIFICATION TO PRESENT A DETAILED DISCUSSION OF THE CONCEPTS BEHIND THE MDA. FOR A DISCUSSION OF THE MDA CONCEPTS, REFER TO THE CONCEPT PAPER.

1.2 OVERVIEW OF (MPT)2 PROCUCTS

Figure 1 displays the six (MPT)^2 products and their expected role in the Army's new streamlined Materiel Acquisition Process (MAP). The first four products, the System Performance Requirements Estimation Aid, the Manpower Constraints Estimation Aid, the Personnel Constraints Estimation Aid, and the Training Constraints Estimation Aid, are designed to estimate MPT-related requirements and constraints during the Requirements/Technology Base Activities Phase of the MAP. These requirements and constraints will guide subsequent contractor design activities.

The System Performance Requirements Estimation Aid (SPREA) will help Army combat developers identify comprehensive and unambiguous system performance requirements needed to accomplish various missions.

The next three (MPT)^2 products are designed to determine MPT constraints. The Manpower Constraints Estimation Aid (MCEA) will identify the maximum crew size for operators and maintainers and the maximum Direct Productive Annual Maintenance Manhours (DPAMM) for maintainers. These constraints will be based on assessments of the manpower likely to be available to man the new system.

The Personnel Constraints Estimation Aid (PCEA) will estimate the significant personnel characteristics that describe and limit the capabilities of the probable soldier population from which the new system's operators and maintainers will come. The PCEA will identify the minimally acceptable boundaries for these characteristics.

The Training Constraints Estimation Aid (TCEA) will identify what the training program for the new system is likely to look like given current training practices in the field. It
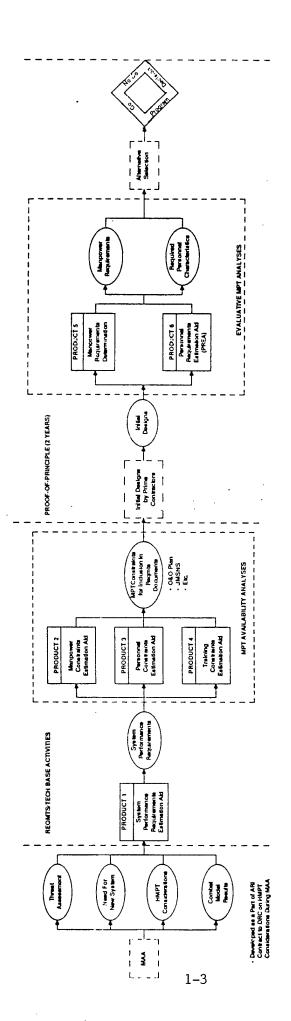
Figure 1. Expected Role of Six (MPT)² Products.

MAA

- Developed as a Part of ARI Contract to DRC on HMPT
- Considerations During MAA

Threat Assessment

Need For New System

HMPT Considerations

Combat Model Results

REOMITS/TECH BASE ACTIVITIES

PRODUCT 1 — System Performance Requirements Estimation Aid

System Performance Requirements

MPT AVAILABILITY ANALYSES

PRODUCT 2 — Manpower Constraints Estimation Aid

PRODUCT 3 — Personnel Constraints Estimation Aid

PRODUCT 4 — Training Constraints Estimation Aid

MPT Constraints for Inclusion in Reqmts Documents
- O&O Plan
- JMSNS
- Etc.

PROOF-OF-PRINCIPLE (2 YEARS)

Initial Designs by Prime Contractors

Initial Designs

EVALUATIVE MPT ANALYSES

PRODUCT 5 — Manpower Requirements Determination

PRODUCT 6 — Personnel Requirements Estimation Aid (PREA)

Manpower Requirements

Required Personnel Characteristics

Alternative Selection

Go / No Go / Problem / DR-18(a)

will also determine the maximum training time available to train the personnel given available training resources.

The last two products help evaluate initial contractor designs. The Manpower Determination Aid (MDA) and the Personnel Requirements Estimation Aid (PREA) are designed for use during the Proof of Principle Phase. They will be used after initial contractor designs have been submitted, but before one design is chosen to develop into a prototype. These products evaluate initial contractor designs and develop MPT alternatives that minimize personnel characteristic deficits (i.e., discrepancies between the type and number of people required and the number of these people likely to be available when the system is fielded).

The Manpower Determination Aid (MDA) determines the quantitative manpower requirements needed to support a contractor design by assessing the workload associated with the tasks that the contractor design specifies.

The Personnel Requirements Estimation Aid (PREA) determines the type and level of personnel characteristics needed to support the effective performance of each task associated with a contractor design.

Personnel characteristic requirements for individual tasks are then aggregated to produce estimated personnel characteristic requirements at the job or duty position level. These job requirements are multiplied by the quantitative manpower requirements to determine the total number of individuals with various levels of personnel characteristics that are required to support that design. The personnel characteristic distribution this analysis produces can then be compared with personnel characteristic constraints to identify deficits.

The results of these two evaluative aids will be used to select a specific design alternative for further development. As such, the results can be incorporated into higher level analyses such as the Cost and Operational Effectiveness Analysis (COEA). The PREA will provide MANPRINT analysts with the information needed to effectively make the "go/no go" decision at the end of the Proof-of-Principle Phase.

1.3 ORGANIZATION OF THE SPECIFICATION

The remainder of this specification paper is organized into four sections. The next section on product requirements includes the product's objectives, significant output, users, role in the acquisition process, assumptions, and the high-level functional requirements/constraints associated with it.

Section 3 describe in detail the software specifications for the two modules that make up the MDA; the Workload Assessment Aid (WAA) and the Maintenance Manpower Analysis Aid (MMAA). Included in this description is a step-by-step presentation of the user interface of the MDA.

The MDA will contain two types of files -- libraries which describe "hardwired" input data and working files that are used to store results related of a particular application. The working files will be used as input to the simulation models that will produce the output files for Product 5. Descriptions and data structures for these two types of files can be found in sections 4 and 5 of this specification. The description of the libraries also includes some of the actual values for the "hardwired" input data.

Section 6 describes, in detail, the simulation models that will be used in the MDA to determine manpower requirements.

Section 7 provides a discussion of the technology transfer issues that relate to Product 5. Included in this section are specifications for user and programmer documentation that will be produced for the Product 5 software.

SECTION 2 - PRODUCT REQUIREMENTS

2.1 OBJECTIVES

The purpose of the Manpower Requirements Determination Aid (MDA) is to determine the quantitative manpower requirements for a specific contractor's design. The MDA will be used during the Proof-of-Principle Phase, after the contractor submits the initial designs, but before one design is chosen to develop into a prototype. The Manpower Determination Aid's output will be used with the output from Product 6. The combined output will help develop manpower, personnel, and training (MPT) alternatives that minimize personnel characteristics deficits. These deficits are discrepancies between the type and number of people required and the number of such people likely to be available when the system is fielded.

2.2 MAJOR OUTPUT

The MDA will determine manpower requirements for each contractor design. These requirements will include: 1) the jobs associated with each design, 2) the tasks associated with each job, and 3) the number of operators or maintainers in each job. In addition to defining manpower requirements by job or duty position, the MDA will be capable of assigning each job to an MOS, and calculating total manpower requirements by military occupational specialty (MOS), skill level, major component item (for maintainers only), and maintenance level (for maintainers only).

In addition to producing manpower requirements estimates, the MDA will have the capability to estimate system availability, reliability, and operational effectiveness. We will compare these estimates with the requirements that the System Performance

Requirements Estimation Aid (Product 1) identified during the Requirements Technology Base Activities Phase of the Materiel Acquisition Process (MAP). This comparison can identify short-falls (discrepancies between requirements and estimates based on contractor design).

2.3 ROLE OF PRODUCT 5 OUTPUT IN ACQUISITION PROCESS

During the acquisition process, manpower requirements for an emerging system are described primarily in two documents. These documents are the basis-of-issue plan (BOIP) and the qualitative and quantitative personnel requirements information (QQPRI) documents. This section explains how these documents present quantitative manpower requirements, where the information comes from, and who is responsible for this information.

The MDA will be designed to provide input to these two documents.

BOIP

The BOIP:

"States the number of new or improved items of equipment and personnel to be included in Tables of Organization and Equipment (TOE) Level 1 (100 percent wartime requirements), Tables of Distribution and Allowances (TDA), Joint Tables of Allowances (JTA), Additive Operational Projects (AOP), and TDA Augmentation to Modified Tables of Organization and Equipment (MTOE) when directed by HQDA." (Revised AR 71-2, Section 1-5)

The BOIP must justify the Manpower requirements it includes by clearly stating:

"The rationale considered in determining the type and number of items and personnel needed to support the principal item (QQPRI, operator and maintainer decision). Personnel increases exceeding requirements document estimates will be justified or trade-off assessment completed." (Section 5-9)

The Deputy Chief of Staff for Operations and Plans (DCSOPS) is the Army staff proponent for the BOIP system.

QQPRI

The revised AR 71-2 describes:

"The QQPRI...[as] a compilation of organizational, doctrinal, training, duty position, and personnel information. It is prepared for a new or improved item of equipment by the materiel developer in coordination with the combat and training developer...The QQPRI is used as follows:

(1) To determine the need to establish or revise a Military Occupational Specialty (MOS), Specialty Skill Identifier (SSI), and civilian OPMCS.

(2) To prepare plans to provide the personnel and training needed to operate, maintain, and transport the new or improved item of equipment.

(3) As a source document for direct productive annual maintenance manhours (DPAMMH)."

Figure 2 presents the QQPRI format. One of the QQPRI's key
components is the DPAMMH:

"[The] DPAMMH will be based on the empirical data or,
as a minimum, estimated hours will be submitted and so
identified for all developmental items of equipment or
system. Hours will be expressed by MOS, SSI, and OPMCS
for each category of maintenance (UL, IDS, IGS, AVIM,
AVUM). When LSA data or engineering estimates are
sources for DPAMMH, the annual usage rate used in the
computation should be provided. This annual usage rate
should be a derivative of equipment mission profile
found in the appropriate materiel need document."
(Section 4.8)

According to AR 71-2, the QQPRI also presents:

"The number of direct operators needed to make up a
crew or operate the system as a single shift and a
listing of duty positions, by descriptive title,
required for operation and maintenance of the equip-
ment. [It also contains] a suggested placement of duty
positions within a current, revised, or new commis-
sioned officer SSI, or warrant officer or enlisted MOS,
special qualification identifier (SQI), ASI, or
civilian OPMCS.

A listing of the individual system unique duties and
tasks to be performed in each of the above identified
positions requiring new, revised, or current MOS, SSI
and OPMCS. Other special characteristics (e.g., a
certain height to operate equipment, a security
clearance required to operate or maintain the equipment

TITLE: The title of the QQPRI will identify the type of QQPRI, the title of the principal item, the LIN, PIP number, and the new equipment training plan (NETP number). This same title will be used on all correspondence forwarding the QQPRI through channels. Note: Once TRADOC assigns the BOIP number, the number(s) will be included in all subsequent correspondence.

1. **REQUIREMENT INFORMATION:**

    a. Requirement or Procurement Directive:
    b. Type Classification (TC) date:
    c. First Unit Equipped date (FUED):
    d. Army Modernization Information Memorandum (AMIM) Number: (Note 1)

2. **DESCRIPTION AND DIRECT PRODUCTIVE ANNUAL MAINTENANCE MANHOURS (DPAMMH):** (Notes 2, 3, 4, and 5)

    a. Principal Item:
    b. Component Major Item:
    c. Total DPAMMH by MOS, SSI, or OPMCS for subparagraphs a and b above:
    d. Associated Support Items of Equipment (ASIOE):

3. **NUMBER DIRECT OPERATORS REQUIRED TO CREW OR OPERATE EQUIPMENT:**

4. **DUTY POSITIONS BY DESCRIPTIVE TITLE:**

5. **INDIVIDUAL UNIQUE DUTIES, TASKS, AND CHARACTERISTICS:** (Notes 6 and 7)

6. **NETP NUMBER AND NET TRAINING BASE REQUIREMENTS:** (Notes 1 and 8)

(Enclosures - Draft Job Specifications)

Note 1.   Use "NA" for paragraphs 1d and 6 when not applicable.

Note 2.   The format subparagraphs a through d above will appear on all QQPRI. This format is very flexible to use on the four subparagraphs (a-d) or can be expanded by using "high school outline" to accommodate major systems, or multiple LIN under each subparagraph (a, b, and d).

Note 3.   Materiel developers will identify LIN, nomenclature, description, levels of maintenance (UL, IDS, IGS, AVIM, AVUM), MOS, SSI, and civilian OPMCS. Materiel developers will always provide DPAMMH for the principal LIN and the component major items whether they are type classified or not. Additionally, the materiel developers will provide DPAMMH for all ASIOE that have developmental items. For type classified ASIOE, the materiel developer will list the LIN and nomenclature only. DPAMMH will be based on the empirical data, or as a minimum, estimates will be submitted and so identified. DPAMMH should represent the maintenance burden generated by one item of equipment during one year. When LSA data or engineering estimates are sources for DPAMMH, the annual usage rate used in the computation should be provided. This annual usage rate should be derivation of equipment mission profile found in the appropriate materiel need document. Usage of "Note" to explain information or rationale is encouraged.

Note 4.   Formatting for each LIN under the subparagraph a and b including the type of equipment is below. MCI will be subdivided by developmental item(s) and type classified item(s); show NSN or PN for all CMI.

Figure 2.   QQPRI Format.
2-11

LIN, Generic Nomenclature, Description (for TMDE start the description with the term "TMDE" and include Central TMDE Activity (CTA) approval number)

MOS/SSI/OPMCS   UL   IDS   IGS

Note 5. Subparagraph c is to be calculated on the basis of one principal item and any CMI in required quantities. Formatting will be:

MOS/SSI/OPMCS   DPAMMH

Note 6. Paragraph 5 above:

a. Do not include skills. The SGA determines the skill level.

b. Include MOSs that support the maintenance levels of all ASIOE.

c. For aviation equipment, include any ground maintenance that is not authorized in AVUM/AVIM, but are at the UL, IDS, and IGS level of maintenance.

Note 7. Paragraph 5 above:

a. If the duties and tasks listed in AR 611-101, AR 611-112, or AR 611-201 are adequate, use the following for each MOS or SSI:

FOR COMMISSIONED OFFICERS:

SSI. . . (indicate any SQI here) performs duties and tasks as listed in AR 611-101.

FOR WARRANT OFFICERS OR ENLISTED:

MOS. . . (indicate any ASI or SQI here) performs duties and tasks as listed in (AR 611-112, AR 611-201).

b. If the duties and tasks listed in AR 611-101, AR 611-112, AR 611-201 do not include the system unique duties, tasks, or characteristics, use the following for each MOS and SSI:

FOR COMMISSIONED OFFICERS:

SSI. . . (indicate any SQI here) . . . . (indicate system unique duties, tasks, characteristics). Other duties and tasks are listed in AR 611-101.

FOR WARRANT OFFICERS OR ENLISTED:

MOS. . . (indicate any ASI or SQI here). . . . (indicate system unique duties, tasks, characteristics). Other duties and tasks are listed in (AR 611-112 or AR 611-201).

c. If the duties and tasks in AR 611-101, AR 611-112 or AR 611-201 need to be revised, use the following for each MOS and SSI:

Figure 2. QQPRI Format (Continued).

2-12

FOR COMMISSIONED OFFICERS:

Revised SSI. . . (indicate any current or new SQI here). Draft proposed job specifications are attached at enclosure. . . . Other duties and tasks are listed in AR 611-101.

FOR WARRANT OFFICERS OR ENLISTED:

Revised MOS. . . (indicate any current or new ASI or SQI here). Draft proposed job specifications are attached at enclosure... . Other duties and tasks are listed in (AR 611-112, AR 611-201).

d. If a new MOS, SSI, ASI, or SQI will be required for AR 611-101, AR 611-112, or AR 611-201, use the following for each MOS and SSI:

FOR COMMISSIONED OFFICERS:

New SSI. . . (indicate any SSI here). Draft proposed job specifications are attached at enclosure. .

FOR WARRANT OFFICERS AND ENLISTED:

New MOS. . . (indicate any ASI or SQI here). Draft proposed job specifications are attached at enclosure. . . .

Note 8. Provide the following for Paragraph 6:

a. NETP number (if none, so state).

b. UIC, quantity, LIN, nomenclature and justification for any NET Training Base requirements.

Figure 2. QQPRI Format (Continued).

The combat developer within the TRADOC proponent school has primary responsibility for developing the BOIP and QQPRI. The Program Manager within the Army Materiel Command (AMC) subordinate command provides input to the combat developer. DCSOPS processes and approves both the BOIP and QQPRI.

The latest version of AR 71-2 recognizes that the Army HARDMAN methodology, as the Army's current manpower determination aid, feeds the BOIP/QQPRI data. But AR 71-2 also leaves room for additional DCSPER-approved methodologies:

> "The results of hardware vs. manpower (HARDMAN) methodology or an approved DCSPER methodology will provide source data for the BOIP and QQPRI process." (Revised AR 71-2, 10 Oct. 1986, p. 10)

The MDA will probably become one of the additional methodologies cited in AR 71-2. By systematically assessing workload, the MDA will provide more accurate estimates of manpower requirements, particularly operator requirements.

Manpower Assessment in Support of Requirements Documents

The Letter of Agreement (LOA) and Required Operational Capability (ROC) both have sections that require reporting the results of a "manpower/force structure assessment." TRADOC/AMC PAM 70-2 describes this assessment as follows:

> "Manpower/Force Structure Assessment. Estimate manpower requirements per system, using unit, and total Army by component (Active, ARNG, USAR). Identify manpower savings resulting from replaced systems, if any. Include a statement to require an assessment of

2-14

alternatives to reduce manpower requirements and an
assessment of force structure implications resulting
from system inclusion in the total force by component.

If the force structure assessment exceeds current
programmed force structure levels, then identification
of force structure tradeoffs within mission area or
mission elements is required. Tradeoffs analysis are
addressed to the degree necessary to bring the force
structure assessment within current programming levels,
if possible. The personnel support package will be
tested during OT II."

Manpower Requirements Determination in MANPRINT

Currently, there are two major sources of MANPRINT
regulatory information. The first is AR-602-2, MANPRINT. The
second is the Draft chapter on MANPRINT that will be included in
the revised TRADOC/AMC PAM 70-2, Materiel Acquisition Handbook
(hereafter referred to as the revised TRADOC/AMC PAM 70-2).

According to AR 602-2 (p. 27), "MANPRINT data to support the
BOIP/QQPRI shall be developed during the Proof-of-Principle Phase
of the MAP. This regulation also cites HARDMAN and (ECA) as two
techniques that can be used "as inputs to the BOIP process" (p.
27).

The revised AR 70-2 identifies the following activities
related to Manpower Requirements Determination Aid (p. 11.44 to
11.76):

Requirements and Technology Base Activities Phase

    o   Initiate HARDMAN and/or ECA early in this phase

Proof-of-Principle Phase

    o   Conduct HARDMAN

    o   Develop input to BOIP/QQPRI

    o   Provide input to ROC on the "number of operators,
maintainers, and repairers the new equipment
requires in each unit." AR 70-2 describes the
manpower requirements information to be included
in the ROC.

The revised version of TRADOC/AMC PAM 70-2 provides
additional information in manpower determination related to
MANPRINT. According to this regulation, the DCD - Materiel and
Logistics System Division, with input from DOTD, ARI, and AMC
should provide input to Required Operational Capability (ROC).
To provide this input this organization should conduct a force
structure analysis using information developed in the organiza-
tional plan. The analysis would determine the number of pieces
of new equipment going into each type unit and the number of
operators, maintainers and repairers the new equipment requires
in each unit. They should also identify proposed bill-payers to
ensure a zero growth in the force structure, if the number
required for the new system exceeds the number available from the
displaced system.

Table 1 provides examples of the manpower and personnel
information to be included in the ROC.

Table 1

Example of Manpower and Personnel Information to be Included in ROC.

This is an example of Manpower/Force Structure Assessment to be included in the ROC, para 5a:

"a. Manpower/Force Structure assessment. The manpower force structure indicates that when the system is fully fielded in accordance with current plans, it will generate the following requirements:

	Crew Per System	Crew System & Support Per Unit	Total Army Aggregate System Support (Other Units)	Total Army
OFF				
WO				
ENL				

Total Army personnel resource requirements are:

Active _____; savings/increase of _____.

USAR _____; savings/increase of _____.

NG _____; savings/increase of _____."

<u>Example of MANPRINT manpower and personnel assessments to be</u>
<u>included in the ROC, para 8b:</u>

"b. Personnel Assessment.

    (1) Crew level cannot exceed three soldiers. No
           maintenance task will require the use of more than one
           soldier. Maintenance tasks, when compared to the
           predecessor system, will be decreased by 20% at the
           unit level.

    (2) The target audience description lists the expected
           aptitude levels (ASVAB scores) of the soldiers who have
           tentatively been identified as the operators and
           maintainers of the XM99.

2.4 USERS

2.4.1 Overview of Users and Their Functions

Primary Users. Primary MDA users will be the Directorate of Combat Development (DCD) organization within the TRADOC proponent schools responsible for developing the BOIP/QQPRI. Usually, this organization will be the Materiel and Logistic System Division. But since each DCD is structured somewhat differently, the responsible organization may vary.

Secondary Users. Another major MDA user will be the program manager's staff within the AMC subordinate command that provides input to the BOIP/QQPRI development process. Usually this staff is the Logistics Division or Group.

Other Users. Other potential users are the BOIP/QQPRI reviewers such as HQ TRADOC (DCSOPS); the Organizational Integrator, or Force Integration Staff Officer (FISO); and the Soldier Support Center-National Capitol Region (SSC-NCR). Other reviewers include HQ AMC (AMCDRE), the MANPRINT Policy Office within ODCSPER (DAPE-ZAM), and the MANPRINT points-of-contact within the TRADOC proponent schools and AMC subordinate command. The ARI field office representatives who may provide MANPRINT support to TRADOC schools or AMC subordinate commands are also potential users.

2.4.2 Job Type

The MDA will be developed specifically for the primary users listed in the section above. These primary users are the combat developers within the TRADOC proponent school who produce the BOIP/QQPRI. The individuals who actually perform these functions within the assigned DCD division are typically Army majors or captains.

2-19

2.5 Assumptions

The following assumptions underly development of the MDA:

Major System Focus. The MDA will describe manpower requirements for major weapon systems. Although the general logic of the MDA applies to other types of systems, we will develop the MDA's automated tools only for major systems.

Difference Between Force Structure Analysis and Manpower Determination. The MDA is an aid for determining manpower. It is not a force structure analysis tool. A manpower determination analysis determines the number of operators and maintainers needed to support a particular weapon system. A force structure analysis determines the size and composition of Army units. Force structure analysis considers tasks beyond those associated with individual weapon systems. It also assesses the impact of personnel and equipment attrition during wartime.

Attrition is beyond the scope of manpower determination as described an Army acquisition documents. As a result, tools such as AMORE that deal with attrition cannot provide a basis for manpower determination.

Operator/Maintainer Differences in Manpower Determination. The basic logic underlying determination of maintenance and operator manpower requirements is the same. It involves dividing workload demand by capacity. However, the specific elements used to calculate them are quite different. Maintenance manpower requirements are determined by computing total maintenance manhours for a given period (usually a fairly long period such as a year) and then dividing the results by a measure of capacity such as annual available maintenance manhours. Operator or maintainer workload is determined by examining cognitive/perceptual/physical workload at particular points in

time and then comparing this workload with the human capabilities for dealing with it. Our approach for determining manpower requirements reflects these differences. We will develop network simulation models to represent both operator and maintainer tasks.

We will evaluate operator manning based on a workload model that McCracken and Aldrich developed (1984)[1]. This process could also be used to determine workload for maintainer tasks if the analyst chooses to do so. The primary method of representing maintainer tasks, will be to use Micro SAINT networks. The networks resemble the ones that have been used to describe maintenance performance in a wide range of studies. Such studies include the Coordinated Human Resource Technology and the Air Force Logistic Composite Model that the Air Force used to determine maintenance manpower requirements.

Contractor Inputs to MDA. We assume that the prime contractor will provide information on the human interface design. This information includes a description of the operation and maintenance of all major system components, including support equipment (with particular emphasis on controls and displays). Basically, the contractor will provide the level of information required by the Type B1 specification of Prime Item Development Specification (see MIL-STD-490).

The MDA will not require information on system tasks, task performance times, or accuracies from the contractor. The MDA itself will provide procedures for generating these information elements.

Use of Army Manpower Algorithms and Allowances. The MDA

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[1]McCracken, J.H., & Aldrich, T.B. (1984). Analysis of selected LHX mission functions: Implications for operator workload and system automation goals (ARI Draft Technical Note).

2-21

will use, without modification, the basic manpower determination algorithm for variable positions in AR 570-2. It will also incorporate the work capacity factors listed in AR 570-2 and the Standards of Grade Authorization found in AR 611-201.

Personnel and Training Assumptions. This specification focuses on the MDA's initial application. In this first application, workload estimates are based on an assumption that (1) personnel with the median level of personnel characteristics (as determined by the Personnel Requirements Estimation Aid) are performing the tasks, and (2) the type and amount of training these personnel have received is that which is most likely to be assigned (as determined by the Training Constraints Estimation Aid).

The MDA will be iterated in subsequent tradeoff analyses as part of the application of the MPT Tradeoff Analysis Aid. These tradeoffs will explore different assumptions about personnel and training.

Job Determination. The MDA will help identify jobs. The analysis will define operator jobs by assigning specific tasks to duty positions. This concept is congruent with the Army's Job Books which break out operator tasks by duty position. After the assignments have been made, the MDA's automated steps will assess how these assignments affect workload and system capability.

Maintenance jobs are defined by assigning specific tasks to MOS/skill level combinations at particular maintenance levels. The Army does not have duty positions for maintainers. The MDA will include procedures for assigning maintenance tasks to MOS/skill level combinations.

2.6 HIGH LEVEL FUNCTIONAL REQUIREMENTS

2.6.1 Technical Requirements

Outputs. The MDA will output quantitative manpower requirements, by job, for a specific contractor design. These manpower requirements will include: (1) operator manpower requirements, (2) maintenance manpower requirements, and (3) Direct Productive Annual Maintenance Manhours (DPAMMH).

For maintenance the MDA will also be capable of breaking out manpower requirements by MOS, skill level, major component item (maintainers only), and maintenance level (maintainers only) and will be capable of breaking out all estimates at both the single system and aggregate level.

In addition to producing estimates of manpower requirements, the MDA will produce estimates of system availability, reliability, and operational effectiveness. These estimates will be compared with the requirements for these criteria identified by the System Performance Requirements Estimation Aid (SPREA) identified during the Requirements Technology/Base Activities phase of the MAP. Based on this comparison, shortfalls (discrepancies between requirements and estimates based on contractor designs) will be identified.

Role in Acquisition Process. The MDA information on manpower requirements will be designed to feed directly into the BOIP/QQPCI.

Users. The MDA will be specifically designed for use by the combat developers within the TRADOC proponent school who produce the BOIP/QQPRI (see Section 2.4.1).

2.6.2 Acceptability/Usability Requirements

The previous sub-section presented an overview of the technical requirements that must be met by the MDA. This section describes some of the acceptability and usability requirements which also must be met by these tools.

Produce Tailored User Outputs and Processes. Previous R&D products have not been implemented because they failed to meet the needs of individual Army decision makers. They were R&D products "in search of users". To avoid this problem in the current effort, it is critical that specific users be identified for the MDA. Furthermore, the outputs of the MDA will be formatted so that Army users can insert them directly in MAP documents. Additionally the aids will be capable of producing results in a timely fashion and be capable of meeting the requirements of the new streamlined acquisition process. The latter requirements indicate a need for using some form of automation to support each product whenever it is cost effective to do so.

Describe "How To" Procedures. Sufficient "how to" procedures will be included in the MDA to allow Army users with minimal training to apply each product. Whenever possible, procedures will be automated to reduce user analysis requirements. However, for all automated tools, detailed procedures for obtaining input data and interpreting results will be presented. For all manual tools, detailed instructions for conducting each analytical step will also be provided.

Minimize Organizational Impacts. The MDA will be designed to fit the user and not vice versa. Consequently, they will not require additional personnel to apply or cause restructuring of existing Army organizations; they will utilize computer hardware available at user locations or accessible via secure lines.

2-24

Minimize User Training. The members of the MAP community
who are expected to be users of the MDA are already overburdened
and understaffed. In addition, they are trying to meet
increasing acquisition requirements such as MANPRINT within the
context of the streamlined acquisition process. Consequently,
training time for the $(MPT)^2$ products will be minimized. This
requires development of user interfaces that require no prior
computer experience. For example, the interface contain built-in
job aids (e.g., help commands). Finally, when formal training is
required, it will be developed in accordance with Army
instructional system design principles and utilize only media
that are readily available or accessible to users.

Security. The MDA may be required to accept classified data
and will be designed to provide acceptable levels of security.

2.7 HARDWARE/SOFTWARE CONFIGURATION

The hardware system that the MDA will be installed on
consists of the following components:

1.   Enhanced graphics display. The EGA will support high
      resolution color graphics.
2.   Enhanced graphics board with 256K bytes RAM.
3.   80286 processor
4.   Hard disk with a minimum of 20M bytes of storage.
5.   Up to 4M bytes of enhanced memory.
6.   Bernoulli Box or its functional equivalent with two
      removable 20M disks.
7.   80287 Math Coprocessor.
8.   1200/2400 baud Hayes-compatible internal modem.
9.   One or more floppy drives that can read and write 360K
      floppy diskettes.
10.   Dot matrix printer capable of printing 132 characters

per line. This printer will be capable of outputting
IBM graphics.

11. IBM AT-compatible keyboard.

The MDA software will be developed under the most recent
version of Microsoft C. At the present time, the operating
system for the software will be DOS 3.2.

The data libraries in the MDA will be built using R-Base V.
We will sort, retrieve, and store information in these files
using code developed in-house via dbC Library routines. These
library functions do not require any licensing fees and will be
fully integrated into the MDA code.

SECTION 3 - STEPS IN APPLYING THE MDA

As was proposed in the concept paper and outlined in section 2 of this design specification, the MDA consists of two distinctly different software tools that the analyst will use to estimate the manpower requirements for a proposed new system. The Maintenance Manpower Analysis Aid (MMAA) will allow the user to analyze the manpower required to maintain a proposed new system in terms of the maintenance jobs required (MOS/Skill levels), the number and types of maintenance tasks that must be performed by each maintenance job, the maintenance manhours required for each job, and an estimate of the headcount required for each maintenance job.

The Workload Assessment Aid (WAA) will guide the user through the process of assessing the manpower requirements of a proposed new system by estimating the workload requirements of a proposed staffing plan for operating the system or for performing maintenance activities.

This section will describe the global keystroke specifications and the user actions that are that are generic to all of the activities that users will perform in using the MDA. These generic specifications are followed by the detailed specifications that are specific for each of the steps within the MMAA and the WAA.

Since the steps associated with each of the analysis aids are so distinctly different, we have used a different numbering scheme for the two sets of steps. The steps in the MMAA are numbered 1.1 through 1.8. Steps in the WAA are numbered 2.1 through 2.11.

The first step in using either the MMAA or the WAA is to identify the system that is to be evaluated. Therefore, the process for performing step 0 will be described before the description of the MMAA or WAA steps.

The description of each step is organized into the following parts:

1. <u>Input</u> - the data that is required for the completion of the step. There are two types of input data.
   o   External - inputs obtained from sources external to the MDA

   o   Internal - data that is obtained from sources that are included within the MDA.

2. <u>Process</u> - a general description of the process that the user will follow to perform the step. Included in the process description is a detailed flow diagram of the actions the user will follow.

3. <u>Output</u> - the data that will be generated as a result of the step.

4. <u>User Interface</u> - a description of the way the user will be prompted and the way the user will respond throughout the performance of the step. This is a very detailed discussion of each screen the user will see as a result of his or her input.

3.1 GLOBAL KEYSTROKE SPECIFICATIONS

Following is a list of the general specifications for the functionality of global function and editing keys for the Product 5 Manpower Determination Aid.

FUNCTION KEYS

F1   Help - This key will always switch the system into the help mode. When this key is pressed, the system will display the first page of context specific help information explaining the current menu, screen, or prompt.

Shift F1   Help Index - When the F1 function key is pressed while holding down the shift key, the user is presented with an index of help information.

F2   Move-by-cell/Edit toggle - This key controls the function of the arrow cursor keys when the user is working in a spreadsheet-like template. In the default state, the arrow keys will move the cursor from cell to cell in the template. When the F2 key is pressed, or when the user begins to type, the system switches into the "Edit" mode and the arrow keys move the cursor character by character (left and right) or line by line (up and down) within a cell. If the cursor is in the first character position of a cell and the left arrow is pressed, or if the cursor is in the topmost line of a particular cell and the up arrow is pressed, the system will beep. The user can terminate an edit operation and return to the "Move-by-cell" state. Repeated pressing of the F2 key will toggle between the move-by-cell and move-by-character states.

F3   <u>Search</u> - When this key is pressed, the user will be
      prompted for a string of characters or keystrokes that
      the system will search for. The string of keystrokes
      is terminated by pressing the F3 key a second time.
      After terminating the string, the system will search
      the current library, template, or list for a match for
      the input string. If a match is found, the cursor is
      moved to the matched input string. If no match is
      found, the cursor remains where it is and a message
      indicating no match found is displayed.

      At times when the F3 key is not active, the user will
      receive a message indicating such.

F4   NOT USED AT THIS TIME

F5   NOT USED AT THIS TIME

F6   NOT USED AT THIS TIME

F7   NOT USED AT THIS TIME

F8   NOT USED AT THIS TIME

F9   <u>Menu</u> - Displays the active menu bar while working in a
      spreadsheet-like template. This key uses a "toggle"
      type of functionality. When the commands on a menu bar
      are displayed, the cursor moves from command to command
      within the menu bar. When the menu bar commands are
      not displayed, the cursor moves around within the
      current template.

F10   <u>Save</u> - Saves the current working file to the
      appropriate permanent file then returns to the current
      working status. NOTE: The "save" command may also

3-4

appear on a menu bar when it is appropriate save at the
end of an activity or procedure. However, in order to
make it easy for a user to save early and often, this
key is also always active.

EDIT KEYS

ESC quit - Always returns to the most recent previous state
such as the most recent menu, screen, or prompt.

Shift ESC super quit - Always returns to the MDA main menu. If
changes have been made to the current working file, the
user will be prompted to save or cancel changes.

Backspace This key is only active when the system is allowing for
input by the user. The backspace key moves the cursor
one space to the left of its current position and
erases any character from that position.

Return Terminates variable length user input. If the user is
currently working in a spreadsheet-like template,
entering the return key changes the state of cursor
movement from move-by-character to move-by-cell.

Caps Lock Toggles the keyboard from a normal state to one that
displays characters as if the shift key was being held
down. When the keyboard is in the "Caps Lock" state
and the user holds down the shift key while pressing
another key, the normal (non-shift) character displays.

Ins Insert - Toggles the system from character insert for
user input to typeover. When the state is character
insert, the characters input by the user are inserted
to the left of the current cursor position. When the

state is typeover, characters are displayed at the
current text cursor position. Any characters currently
displayed at that position will be replaced.

Del   <u>Delete</u> - Deletes characters that are displayed at the
            current text cursor position.

Home   Moves the menu cursor to the top or the left most menu
            selection. Moves the cell cursor to the upper left
            corner of a spreadsheet-like template. Moves the text
            cursor to the upper left most typing position of the
            current input area (i.e., cell, field, etc.). See
            cursor definitions below.

End   The end key works the exact opposite of the home key.
            It moves the menu cursor to the bottom or the right
            most menu selection. It moves the cell cursor to the
            lower left corner of a spreadsheet-like template. It
            moves the text cursor to the lower right most typing
            position of the current input area. See cursor
            definitions below.

PgUp   <u>Page Up</u> - If the cursor (menu, text, of cell) position
            is not at the top of the current visible display or
            window, the cursor is moved to that position. If the
            cursor position is at the top of the current visible
            display or window, the cursor is moved to the top of
            the previous full screen or window-full of information.

PgDn   <u>Page Down</u> - If the cursor (menu, text, or cell)
            position is not at the bottom of the current visible
            display or window, the cursor is moved to that
            position. If the cursor position is at the bottom of
            the current visible window, the cursor is moved to the

bottom of the next full screen or window-full of information.

Up Arrow - Moves the cursor (menu, text, or cell) up one position (line or cell).

Down Arrow - Moves the cursor (menu, text, or cell) down one position (line or cell).

Left Arrow - Moves the cursor left one position (character or cell).

Right Arrow - Moves the cursor right one position (character or cell).

Ctrl Up Arrow - Moves the cursor (menu, text, or cell) up one full screen or window-full of information to its same relative horizontal position.

Ctrl Down Arrow - Moves the cursor down one full screen or window-full of information to its same relative horizontal position.

Ctrl Left Arrow - Moves the cursor to the left by one screen or window-full of information to its same relative vertical position.

Ctrl Right Arrow - Moves the cursor to the right by one full screen or window-full of information to its same relative vertical position.

CURSOR TYPES

Text Cursor   Indicates the typing position for user input of
information. The text cursor is a flashing
underscore character.

Menu Cursor   Highlights a menu option. The menu cursor can be
moved in appropriate direction with the arrow keys
on the numeric key pad.

Cell Cursor   Highlights an entire cell in a spreadsheet-like
template to indicate which cell any subsequent
activity will take place. The arrow keys move the
cell cursor from cell to cell in the direction of
the arrow.

3.2 MENU TYPES AND SELECTION STRATEGIES

Menu Bars   Display at the top of the screen. The exception
to this is the menu bar that displays at the
bottom of help screens. Menu bars contain a
horizontally displayed list of command verbs. To
select a command verb from a menu bar, you either
press the fist letter of the command you want to
issue or move the menu cursor with the left and
right arrow keys to the desired command and then
press the RETURN key. The cursor on a menu bar
will wrap from the last command to the first and
vice versa.

When a command is highlighted on a menu bar, a
brief description of that option is displayed on
the line directly below the horizontal list of
menu options.

Pop-Up Menus   There are two levels of pop-up menus. The first
               level is a direct result of selecting a command
               from a menu bar or from a main flowchart menu that
               displays at the beginning of the MDA, the MMAA, or
               the WAA (see description below). The second level
               of pop-up menus display overlapped on the first
               level and are a direct result of a selection from
               the first level menu.

               Menu items on a pop-up menus consist of either
               activity areas you select to work in or items from
               a taxonomy, library, or other list that you can
               select.

               There will be a maximum of ten possible selections
               displayed on a pop-up menu. Each selection
               position will be numbered 0-9. If there are more
               items in the list than will fit into one of the
               selection positions, the user will be able to
               scroll or page through the list with arrow keys.

               There are two ways that you can select an item
               from a pop-up menu. You can press the key
               corresponding to the position number displayed
               next to the option you desire. You can move the
               menu cursor to the option you want to select with
               the up and down arrow keys and/or the PgUp and
               PgDn keys and then press the RETURN key.

               Some pop-up menus may be displayed with command
               verbs shown at the bottom of the pop-up window.
               Commands appear on the pop-up menu (rather than on
               the menu bar) when the actions that they invoke
               apply only to the current pop-up menu. For
               example, in may be necessary to insert a new item

into a list that displays in a second level pop-up menu. In this case, if the "insert" command appeared at the bottom of the second level pop-up menu.

The procedure for selecting a command from a pop-up menu is the same as for selecting a command from a menu bar.

Pressing the ESC key always returns control to the previous menu or prompt.

3.3 GENERIC COMMAND DESCRIPTIONS

Following is a list of descriptions of commands whose general functionality is consistent throughout the MDA. Commands that are specific to an individual step are described in the discussion of the screens that apply to that step.

select   The select command is used in two slightly different contexts. However, its use is consistent throughout the MDA. When the select command is displayed at the bottom of a first level pop-up menu with the type-in as the other command option, it means "I want to select an entry for the highlighted field from a list of options". When the select command is displayed at the bottom of a list of options select means to choose the highlighted option. When the pop-up menu consists of a list of options and there are no commands displayed, the user can issue an implicit "select" command by highlighting the desired option and pressing the <ENTER> key or by pressing the number of the desired option.

insert   This command lets the user "insert" a new item into a
         list of options such as a new functional system or a
         new Mission/Condition Set file name. To perform the
         "insert" operation, the user highlights the option
         before the position where the insert is to occur.
         Then, when the insert command is issued by highlighting
         it and pressing <ENTER> or by pressing the "i" key, a
         new position opens up in the list with a flashing
         cursor prompting the user to enter a new name. After
         the new name has been entered, the system will behave
         as if a "modify" command had been issued (see below).

modify   When this command is available, it lets the user modify
         parameters that are associated with a given option.
         For example, in many cases a menu will contain a list
         of template names such as the list of function
         templates. When the user chooses the modify command he
         or she will be able to enter or modify information
         contained in the highlighted template name.

copy   This command lets the user "copy" an item in a list of
         options such as a functional system or a
         Mission/Condition Set file name. When an item is
         copied, all of the parameters or information associated
         with that item will also be copied. To perform the
         "copy" operation, the user highlights the option to be
         copied. Then, when the copy command is issued by
         highlighting it and pressing <ENTER> or by pressing the
         "c" key, a new position opens up in the list with a
         flashing cursor prompting the user to enter a new name.

delete   In the general sense, this command lets the user delete
         an item and all of its associated parameters and
         information from a list of options. When the delete
         command is issued, the user will be presented with a

message notifying that data will be lost if the delete
is executed. When this message is displayed, the user
will be required to verify or cancel the delete
operation. Any specific functionality for the delete
command that differs from this definition will be
described in the discussion of the screens that apply
to that procedure.

3.4 STEP 0 - Enter the MDA and Identify the System to be
              Evaluated.

In this step, the user will gain access to the Manpower
Determination Aid. From the first level of MDA interfaces, users
will indicate whether they want to begin an analysis of a new
system or resume work on an analysis already in-progress.
Whether beginning a new analysis or resuming work on an existing
analysis, the analysis must begin by identifying the system.

   3.4.0.1 Input

   External: The external input to this step is a set of System
            Files and Mission/Condition Set Files obtained
            from a Product 1 SPREA Analysis (if available).

   Internal: The internal inputs for this step are the
            taxonomies for Mission Areas, System Types,
            Generic Functional Systems, and
            Mission/Conditions.

   3.4.0.2 Process

The user will begin by accessing the MDA software from his
or her computer system. This will be accomplished by simply
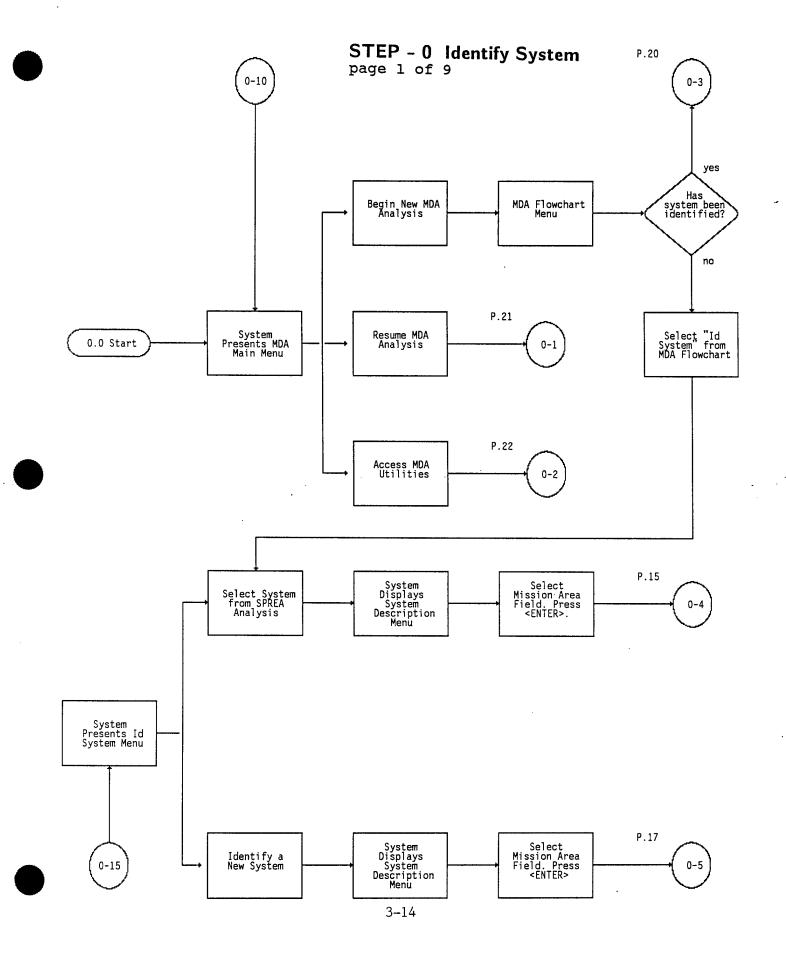
booting up the operating system and, at the operating system prompt, entering: MDA
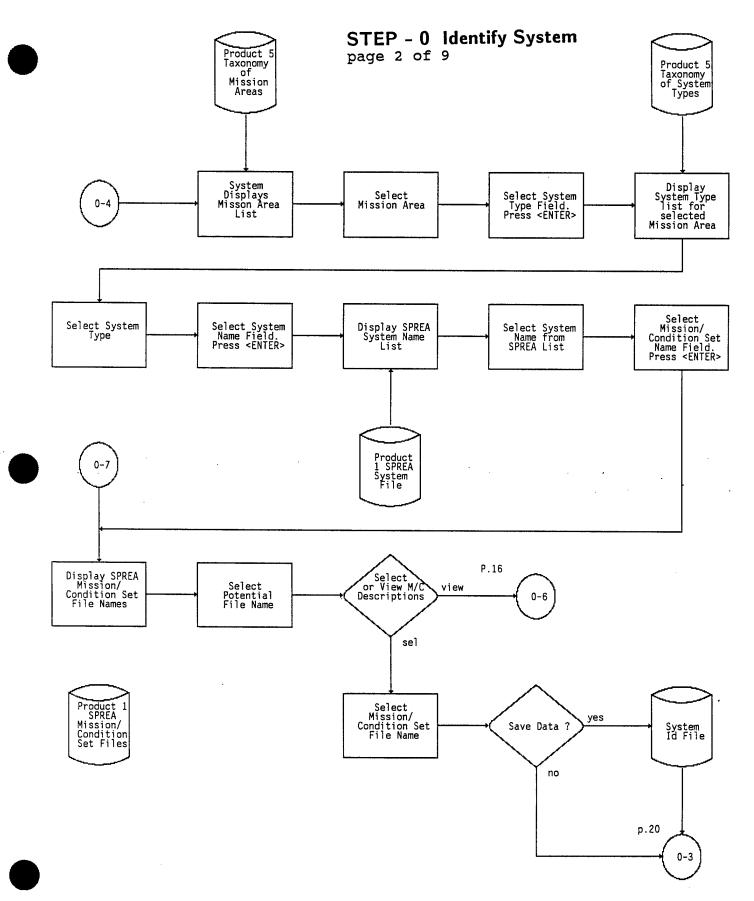
Once the user has gained access to the MDA software, he or she will specify whether to begin an analysis for a new system, resume an in-progress analysis or gain access to the MDA Utilities.
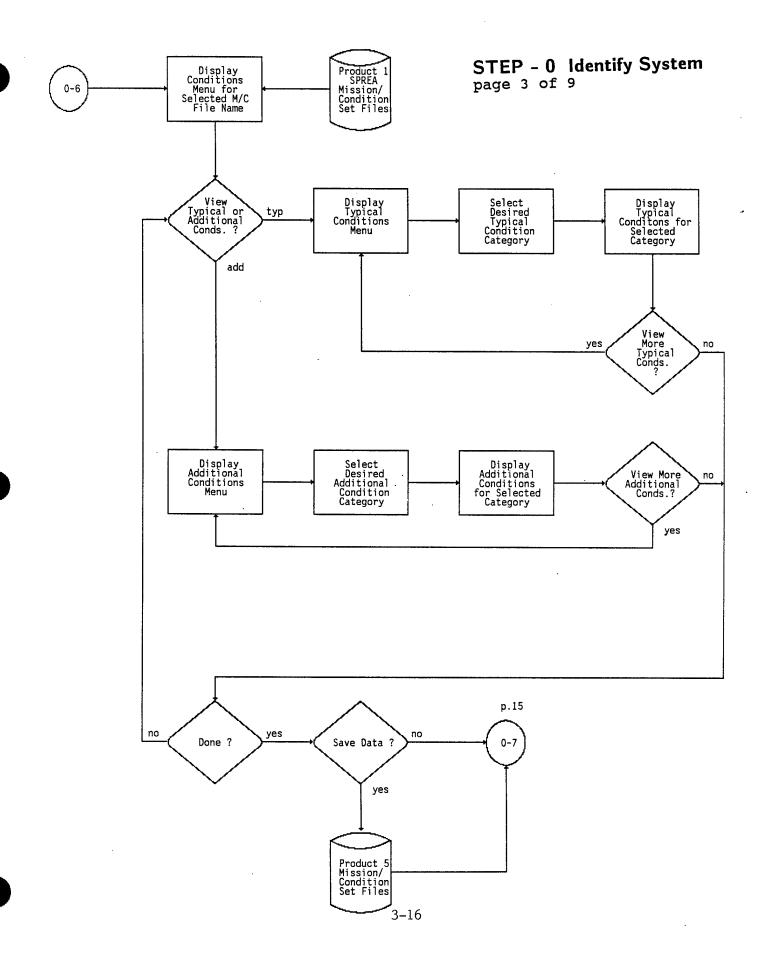
If the user chooses to begin a new analysis, the MDA software will guide him or her through a complete identification of the system to be analyzed. This will include identifying the Mission Area, System Type, System Name, and Mission/Conditions for the MDA analysis. When the user is beginning a new analysis, he or she will also be able to choose whether to select the system from a Product 1 SPREA analysis or to identify a new system from scratch.

If the user is resuming work on an existing system under evaluation, he or she will only need to specify the system name and the Mission/Condition set file name to identify the system.

The flow diagrams of the process of performing step 0 are included on the following pages.

P.20

(0-10)

(0-3)

yes

```
┌─────────────┐      ┌─────────────┐        ╱╲
│ Begin New MDA│─────▶│ MDA Flowchart│──────▶╱  ╲
│   Analysis   │      │    Menu      │      ╱ Has ╲
└─────────────┘      └─────────────┘      ╱ system been╲
                                          ╲ identified? ╱
                                           ╲          ╱
                                            ╲        ╱
                                             ╲╱
```

no

```
┌──────────┐    ┌─────────────┐   ┌──────────────┐             ┌──────────────┐
│ 0.0 Start│───▶│   System    │   │  Resume MDA  │     P.21     │  Select "Id  │
└──────────┘    │ Presents MDA│──▶│   Analysis   │───▶( 0-1 )   │ System" from │
                │  Main Menu  │   └──────────────┘             │ MDA Flowchart│
                └─────────────┘                                 └──────────────┘
```

P.21

(0-1)

P.22

```
┌──────────────┐
│  Access MDA  │      P.22
│  Utilities   │───▶( 0-2 )
└──────────────┘
```

```
┌──────────────┐    ┌──────────────┐   ┌──────────────┐            
│Select System │    │   System     │   │   Select     │    P.15    
│ from SPREA   │──▶ │  Displays    │──▶│Mission Area  │───▶( 0-4 ) 
│  Analysis    │    │   System     │   │Field. Press  │            
└──────────────┘    │ Description  │   │  <ENTER>.    │            
                    │    Menu      │   └──────────────┘            
                    └──────────────┘                              
```

P.15

(0-4)

```
┌──────────────┐
│   System     │
│ Presents Id  │
│ System Menu  │
└──────────────┘
```

```
┌──────────────┐    ┌──────────────┐   ┌──────────────┐            
│ Identify a   │    │   System     │   │   Select     │    P.17    
│ New System   │──▶ │  Displays    │──▶│Mission Area  │───▶( 0-5 ) 
└──────────────┘    │   System     │   │Field. Press  │            
                    │ Description  │   │  <ENTER>     │            
                    │    Menu      │   └──────────────┘            
                    └──────────────┘                              
```

(0-15)

P.17

(0-5)

3-14

Product 5 Taxonomy of Mission Areas

Product 5 Taxonomy of System Types

(0-4) → System Displays Misson Area List → Select Mission Area → Select System Type Field. Press <ENTER> → Display System Type list for selected Mission Area

Select System Type → Select System Name Field. Press <ENTER> → Display SPREA System Name List → Select System Name from SPREA List → Select Mission/ Condition Set Name Field. Press <ENTER>

Product 1 SPREA System File

(0-7)

Display SPREA Mission/ Condition Set File Names → Select Potential File Name → ⟨ Select or View M/C Descriptions ⟩ — view → P.16 (0-6)

| sel

Product 1 SPREA Mission/ Condition Set Files

Select Mission/ Condition Set File Name → ⟨ Save Data ? ⟩ — yes → System Id File

no

p.20 (0-3)

(0-6) → Display Conditions Menu for Selected M/C File Name ← Product 1 SPREA Mission/ Condition Set Files

View Typical or Additional Conds. ? —typ→ Display Typical Conditions Menu → Select Desired Typical Condition Category → Display Typical Conditons for Selected Category

add

View More Typical Conds. ? —yes→ (to Display Typical Conditions Menu) / no →

Display Additional Conditions Menu → Select Desired Additional Condition Category → Display Additional Conditions for Selected Category → View More Additional Conds.? —no→ / yes→ (to Display Additional Conditions Menu)

Done ? —no→ / —yes→ Save Data ? —no→ (0-7) p.15 / yes→ Product 5 Mission/ Condition Set Files

3-16

```
  ┌─────┐        ┌──────────────┐     ┌──────────────┐     ┌──────────────┐     ┌──────────────┐
  │ 0-5 │───────▶│   System     │────▶│   Select     │────▶│Select System │────▶│System Displays│
  └─────┘        │  Displays    │     │ Mission Area │     │ Type Field.  │     │List of System │
                 │ Mission Area │     │              │     │Press <ENTER> │     │   Types for   │
                 │    List      │     │              │     │              │     │   selected    │
                 └──────────────┘     └──────────────┘     └──────────────┘     │ Mission Area  │
                        ▲                                                        └──────────────┘
                        │                                                               ▲       │
                   ╭────┴────╮                                                     ╭─────┴───╮  │
                   │Product 5│                                                     │Product 5│  │
                   │ Mission │                                                     │ System  │  │
                   │  Area   │                                                     │  Type   │  │
                   │Taxonomy │                                                     │Taxonomy │  │
                   ╰─────────╯                                                     ╰─────────╯  │
      ┌──────────────────────────────────────────────────────────────────────────────────────┘
      │
      ▼
  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐   ┌──────────────┐   ┌──────────────┐
  │Select System │──▶│Select System │──▶│  Enter New   │──▶│   Select     │──▶│System Displays│
  │    Type      │   │  Name Field  │   │ System Name  │   │  Mission/    │   │   Current     │
  │              │   │              │   │              │   │Condition Set │   │ Condition Set │
  │              │   │              │   │              │   │   Field      │   │Menu for System│
  │              │   │              │   │              │   │              │   │     Name      │
  └──────────────┘   └──────────────┘   └──────────────┘   └──────────────┘   └──────────────┘
                                                                                        │
                                              ┌─────────────────────────────────────────┘
                                              │
  ┌──────┐                              ┌──────────────┐
  │ 0-14 │─────────────────────────────▶│ Select Menu  │
  └──────┘                              │   Command    │
                                        └──────────────┘
                                               │
      ┌────────────────────┬──────────────────┼──────────────────┬──────────────────┐
      │            insert   │          modify  │          copy    │          delete  │
      ▼                     ▼                  ▼                  ▼                  ▼
  ┌──────────────┐       ┌─────┐            ┌─────┐            ┌─────┐            ┌─────┐
  │  Select a    │       │ 0-8 │            │ 0-8 │            │ 0-9 │            │0-10 │
  │  Mission     │       └─────┘            └─────┘            └─────┘            └─────┘
  │Condition Set │        p.18               p.18               p.20               p.14
  │From the Menu │
  └──────────────┘
         │
         ▼                                               p.20
     ╱───────╲      no       ┌─────┐
    ╱ Save    ╲─────────────▶│ 0-3 │
    ╲ Data ?  ╱              └─────┘
     ╲───────╱                  ▲
         │ yes                  │
         ▼                      │
     ╭────────╮                 │
     │ System │─────────────────┘
     │   Id   │
     │ Files  │
     ╰────────╯
```

STEP – 0 Identify System
page 4 of 9

3-17

STEP - 0 Identify System
page 5 of 9

(0-11) → | Select Desired Typical Condition Category | → | System Displays Typical Conditons for Selected Category | → | Select and Modify Desired Fields of Typical Conditions |

no ← ◇ Done ? ── yes → P.18 → (0-13)

(0-12) → | Select Desired Additional Condition Category | → | System Displays Additional Conditions for Selected Category | → | Select and Modify Desired Fields of Additional Conditions |

no ← ◇ Done ? ── yes → p.18 → (0-13)

```
( 0-1 ) → System Displays Resume MDA Analysis Menu → <Type-in or Select System name>
```

Flowchart — STEP 0 Identify System:

- (0-1)
- System Displays Resume MDA Analysis Menu
- Decision: Type-in or Select System name
  - sel → System Displays List of System Names → Select Desired System Name
  - type → Type in the System Name You Want to Resume Work on.
- Decision: Type-in or Select M/C Set Name ?
  - sel → System Displays Current M/C Set Names for System Name → p.17 (0-14)
  - type → Type in the Mission/Condition Set Name
- Type in the Mission/Condition Set Name : → p.20 (0-3)
- Decision: Done ?
  - no → (back to System Displays Resume MDA Analysis Menu)
  - yes → Decision: Save Data ?
    - no → (0-3)
    - yes → Product 5 Mission/Condition Set Files → (0-3)

STEP - 0 Identify System
page 7 of 9

3-20

(0-9) → [Move Cursor to the M/C Name You Want to Copy. Press <ENTER>] → [Type in a File Name for the New Copy. Press <ENTER>] →P.17→ (0-14)

(0-9) → [Move Cursor to the M/C. Name You Want to Delete. Press <ENTER>] → [Verify the Delete by Pressing <ENTER>] →p.17→ (0-14)

(0-3) → [Select an Activity from the MDA Flowchart Menu]

[Identify System] →p.14→ (0-15)

[Maintenance Manpower Analysis Aid] → (1.0)

[Workload Analysis Aid] → (2.0)

3-21

```
                                    ┌──────────────┐
                                    │              │
                              ┌────→│   Directory  │
                              │     │              │
                              │     └──────────────┘
                              │
                              │     ┌──────────────┐
                  ┌─────┐     │     │              │
                 ╱       ╲    ├────→│  Delete File │
                │   0-2   │   │     │              │
                 ╲       ╱    │     └──────────────┘
                  └──┬──┘     │
                     │        │     ┌──────────────┐
                     │        │     │              │
                     ↓        ├────→│   Copy File  │
            ┌──────────────┐  │     │              │
            │   System     │  │     └──────────────┘
            │   displays   │  │
            │   Utilities  ├──┤     ┌──────────────┐
            │   menu       │  │     │              │
            └──────────────┘  ├────→│  Print File  │
                              │     │              │
                              │     └──────────────┘
                              │
                              │     ┌──────────────┐
                              │     │              │
                              ├────→│ Format Disk  │
                              │     │              │
                              │     └──────────────┘
                              │
                              │     ┌──────────────┐
                              │     │              │
                              └────→│   Settings   │
                                    │              │
                                    └──────────────┘
```

3.4.0.3 Output

The output of this step is the creation of a file that identifies the system for future I/O activities and the creation of a Mission/Condition set file that describes the mission for the current analysis and conditions under which that mission will be analyzed.
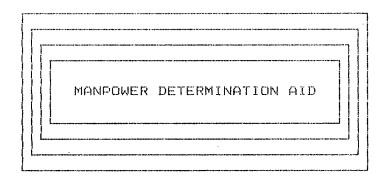
3.4.0.4 User Interface

The user interfaces that apply to this step are described in detail on the following pages. Please note that all screens for step 0 are labeled "Screen 0.X".

Screen 0.1 -   Access the Manpower Determination Aid by typing "MDA" at the operating system prompt (C>_).

This is the Manpower Determination Aid Title Screen.

<u>User Action:</u>

<SPACE BAR>   This is the only accepted input with the exception of F1 (help). The system displays screen 0.2.

```
+------------------------------------------------------------+
|  +------------------------------------------------------+  |
|  |  +------------------------------------------------+  |  |
|  |  |                                                |  |  |
|  |  |       MANPOWER  DETERMINATION  AID             |  |  |
|  |  |                                                |  |  |
|  |  +------------------------------------------------+  |  |
|  +------------------------------------------------------+  |
+------------------------------------------------------------+
```

Press the SPACE BAR to begin

Screen 0.1 -   **Access the Manpower Determination Aid by typing "MDA" at the operating system prompt (C>_).**

Screen 0.2 - Manpower Determination Aid Main Menu.

<u>User Action:</u>
The user can take generic menu selection procedures to select one of the items on the menu. If the user presses the <ESC> key, screen 0.1 will display.

1. Begin Analysis - When the user selects this option, screen 0.3 displays.

2. Resume Analysis - When the user selects this option, screen 0.3 displays.

3. Utilities - When the user selects this option, screen 0.59 displays.

<ESC> - Displays screen 0.1.

```
+------------------------------------------------+
|        MANPOWER  DETERMINATION  AID            |
|              MAIN  MENU                         |
+------------------------------------------------+
|                                                |
|        1.   Begin Analysis                     |
|        2.   Resume Analysis                    |
|        3.   Utilities                          |
|                                                |
|                                                |
+------------------------------------------------+
```

Screen 0.2 - Manpower Determination Aid Main Menu.

Screen 0-3 - Flowchart Menu for the MDA

This screen is a menu of the activities that the user can select from within the MDA. The way that the menu is displayed also serves as a flowchart of the sequence in which the activities should be performed. The flowchart shows that the "Identify System" option must be performed before selecting either the MMAA or the WAA. Once the system has been identified, the user can select either the MMAA or the WAA as the next option. The user can select an item from the flowchart menu by using one of the normal (generic) menu selection procedures:
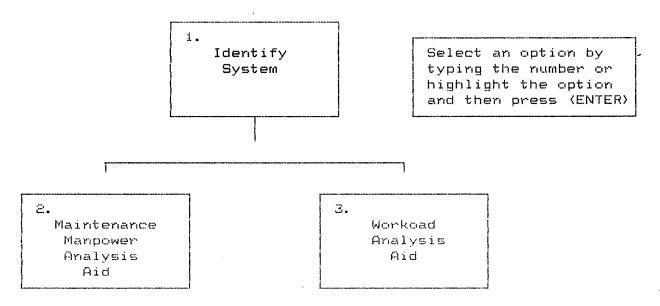
1.   Highlight the desired option using the up, down, left, right arrow keys and then press <ENTER>.

2.   Enter the number of the desired option.

User Actions:

1.   Identify System - If the user previously chose to begin a new analysis, the next screen is 0.5. If the user chose to resume an analysis already in-progress, the next screen is 0.50.

2.   Maintenance Manpower Analysis Aid - if this option is selected and the system has not been identified, the next screen is 0.4. If the system has been identified, the next screen is 1.0.

3.   Workload Analysis Aid - if this option is selected and the system has not been identified, the next screen is 0.4. If the system has been identified, the next screen is 2.0.

<ESC> - Returns the user to screen 0.2.

FLOWCHART FOR THE MANPOWER DETERMINATION AID

```
┌─────────────────────────┐        ┌─────────────────────────────┐
│ 1.                       │        │ Select an option by         │
│         Identify         │        │ typing the number or        │
│         System           │        │ highlight the option        │
│                          │        │ and then press <ENTER>      │
└─────────────────────────┘        └─────────────────────────────┘
```

```
┌─────────────────────────┐        ┌─────────────────────────┐
│ 2.                       │        │ 3.                       │
│    Maintenance           │        │    Workoad               │
│    Manpower              │        │    Analysis              │
│    Analysis              │        │    Aid                   │
│    Aid                   │        │                          │
└─────────────────────────┘        └─────────────────────────┘
```

Screen 0-3 - Flowchart Menu for the MDA

Screen 0.4 - Error Message.

The user has chosen to access the MMAA or the WAA without
first identifying the system.

<u>User Action:</u>
The only acceptable user action from this screen is to press
the <ENTER> key. Next screen is 0.3.

FLOWCHART FOR THE MANPOWER DETERMINATION AID

1.

You must identify the system before
you can analyze maintenance or
workload requirements.

Press (ENTER) to continue.

ct an option by
ng the number or
light the option
then press (ENTER)

2.
Maintenance
Manpower
Analysis
Aid

3.
Workoad
Analysis
Aid

Screen 0.4   **Error Message**

Screen 0.5 -   Identify System Menu.

    Lets the user choose to identify a system for which a
    Product 1 SPREA analysis was performed or identify an
    entirely new system from scratch.

    <u>User Action:</u>
    1.   Select system from SPREA analysis. Next screen is 0.6.

    2.   Identify new system. Next screen is 0.6

    <ESC> - Returns the user to screen 0.3.

```
┌─────────────────────────────────────────────────────┐
│                  IDENTIFY SYSTEM                      │
├─────────────────────────────────────────────────────┤
│                                                       │
│    1.  Select system from SPREA analysis              │
│    2.  Identify new system                            │
│                                                       │
└─────────────────────────────────────────────────────┘
```

Screen 0.5 -   Identify System Menu.

Screen 0.6 -   System Description Menu.

From this menu, the user will identify the Mission Area,
System Type, System Name, and Mission/Condition Set for the
system under evaluation. If the user is selecting a system
from a SPREA analysis, the System Name and Mission/Condition
Set name will come from Product 1 SPREA files.

The fields on the System Description menu must be entered in
order. For example, if the user selects the System Type
field and the Mission Area has not been identified, an error
message will be displayed.

<u>User Actions:</u>
1.   Mission Area. Next screen 0.7.

2.   System Type. If the Mission Area has been defined, the
      next screen is 0.9. If the Mission Area has not yet
      been defined, an error message displays.

3.   System Name. If the Mission Area and the System type
      have been defined, and the user has previously chosen
      to select a system from a Product 1 SPREA analysis, the
      next screen will be 0.11. If the Mission Area and the
      System Type have been defined, and the user has chosen
      to identify a new system entirely from scratch, the
      next screen will be 0.22. If the Mission Area or
      System Type have <u>not</u> yet been defined, an error message
      displays.

4.   Mission/Condition Set Name. If the Mission Area, the
      System Type, and the System Name have been defined, and
      the user has previously chosen to select a system from
      a Product 1 SPREA analysis, the next screen will be
      0.11. If the Mission Area, System Type, and System

Name have been defined, and the user has chosen to
identify a new system entirely from scratch, the next
screen will be 0.24. If the Mission Area, System Type,
and System Name have not yet been defined, an error
message displays.

<ESC> - Returns the user to screen 0.5.

```
┌─────────────────────────────────────────────────────┐
│                  SYSTEM DESCRIPTION                   │
├─────────────────────────────────────────────────────┤
│                                                       │
│   1.   Mission Area:                                  │
│   2.   System Type:                                   │
│   3.   System Name:                                   │
│   4.   Mission/Conditions Set Name:                   │
│                                                       │
└─────────────────────────────────────────────────────┘
```

Screen 0.6 -   System Description Menu.

Screen 0.7 -   Mission Area List. From this list, the user will
               select a Mission Area for the system under
               evaluation.

     User Action:
     The user will select a Mission Area from the list using
     normal menu selection procedures. Next screen 0.8.

     <ESC> - Returns the user to screen 0.6.

     Input File:
     Product 5 Mission Area/System Type Taxonomy

```
.--------------------------------------------------------------.
|                  SYSTEM DESCRIPTION              .------------+------------------------------.
|--------------------------------------------------|           |    Mission Area List          |
|                                                  |           +-------------------------------|
|     1.    Mission Area:                          |     1.    Air Defense                     |
|     2.    System Type:                           |     2.    Aviation                        |
|     3.    System Name:                           |     3.    Combat Service Support          |
|     4.    Mission/Conditions Set Name:           |     4.    Close Combat Light              |
|                                                  |     5.    Close Combat Heavy              |
'--------------------------------------------------'     6.    Fire Support                    |
                                                   '---------------------------------------------'
```

Screen 0.7 -   **Mission Area List. From this list, the user will select a Mission Area for the system under evaluation.**

Screen 0.8 -   System Description Menu with Mission Area
                selected.

    From this screen, the user can select the System Type field.

    User Action:
    1.   Mission Area. Next screen 0.7.

    2.   System Type. Next screen 0.9.

    3.   System Name. If the Mission Area and the System type
         have been defined, and the user has previously chosen
         to select a system from a Product 1 SPREA analysis, the
         next screen will be 0.11. If the Mission Area and the
         System Type have been defined, and the user has chosen
         to identify a new system entirely from scratch, the
         next screen will be 0.22. If the Mission Area or
         System Type have <u>not</u> yet been defined, an error message
         displays.

    4.   Mission/Condition Set Name. If the Mission Area, the
         System Type, and the System Name have been defined, and
         the user has previously chosen to select a system from
         a Product 1 SPREA analysis, the next screen will be
         0.11. If the Mission Area, System Type, and System
         Name have been defined, and the user has chosen to
         identify a new system entirely from scratch, the next
         screen will be 0.24. If the Mission Area, System Type,
         and System Name have not yet been defined, an error
         message displays.

    <ESC> - Returns the user to screen 0.5.

```
 _____
|                                                        |
|                   SYSTEM DESCRIPTION                   |
|========================================================|
|                                                        |
|    1.   Mission Area: Aviation                         |
|    2.   System Type:                                   |
|    3.   System Name:                                   |
|    4.   Mission/Conditions Set Name:                   |
|                                                        |
|_____|
```

Screen 0.8 -   **System Description Menu with Mission Area selected.**

Screen 0.9 -   Aviation System Types List.

From this list the user will select a System Type category
for the system under evaluation.

<u>User Action:</u>
The user will use normal menu selection procedures to choose
a System Type from the list.   Next screen 0.10.

<ESC> - Returns the user to screen 0.8.

<u>Input File:</u>
Product 5 Mission Area/System Type Taxonomy.

```
 _____
|            SYSTEM DESCRIPTION              |
|_____|
|                                            |
|   1.   Mission Area: Aviation              |
|   2.   System Type:                 _____|_____
|   3.   System Name:                |        Aviation System Types           |
|   4.   Mission/Conditions Set Name:|_____|
|_____|                                        |
                                    |   1. Attack Helicopters                |
                                    |   2. Cargo Helicopters                 |
                                    |   3. Utility Helicopters               |
                                    |   4. Scout Helicopters                 |
                                    |   5. Other Helicopters                 |
                                    |   6. Fixed Wing                        |
                                    |_____|
```

Screen 0.9 -   **Aviation System Types List.**

Screen 0.10 - System Description menu with Mission Area and
               System Type selected.

From this screen, the user can select the System Name field
or either of the previously identified fields.

User Action:
1.   Mission Area. Next screen 0.7.

2.   System Type. Next screen 0.9.

3.   System Name. If the user has previously chosen to
      select a system from a Product 1 SPREA analysis, the
      next screen will be 0.11. If the user chose to
      identify a new system entirely from scratch, the next
      screen will be 0.22.

4.   Mission/Condition Set Name. If the Mission Area, the
      System Type, and the System Name have been defined, and
      the user has previously chosen to select a system from
      a Product 1 SPREA analysis, the next screen will be
      .0.11. If the Mission Area, System Type, and System
      Name have been defined, and the user has chosen to
      identify a new system entirely from scratch, the next
      screen will be 0.24. If the Mission Area, System Type,
      and System Name have not yet been defined, an error
      message displays.

<ESC> - Returns the user to screen 0.5.

```
+----------------------------------------------------------+
|                  SYSTEM DESCRIPTION                       |
|----------------------------------------------------------|
|                                                          |
|   1.   Mission Area: Aviation                            |
|   2.   System Type: Utility Helicopters                  |
|   3.   System Name:                                      |
|   4.   Mission/Conditions Set Name:                      |
|                                                          |
+----------------------------------------------------------+
```

Screen 0.10 -   **System Description menu with Mission Area and System Type selected.**

Screen 0.11 - List of SPREA System Names for the current System
                Type.

        From this screen the user can select a system that has
        undergone a Product 1 SPREA analysis.

        User Actions:
        The user will use normal menu selection procedures to choose
        a system name from the list. Next screen is 0.12.

        <ESC> - Returns the user to screen 0.10.

        Input File:
        Product 1 System files for the current System Type.

```
 _____
|          SYSTEM DESCRIPTION               |
|_____|
|                                           |
|  1.   Mission Area: Aviation              |
|  2.   System Type: Utility Helicopters    |
|  3.   System Name:                 _____|_____
|  4.   Mission/Conditions Set Name:|          SPREA UTILITY HELICOPTERS         |
|_____|_____|
                                    |                                            |
                                    |  1.    UH-1 Iroquois                        |
                                    |  2.    UH-60 Black Hawk                      |
                                    |  3.    UH-2C                                |
                                    |  4.       .                                |
                                    |  5.       .                                |
                                    |  6.       .                                |
                                    |  7.       .                                |
                                    |  8.       .                                |
                                    |  9.       .                                |
                                    |  0.       .                                |
                                    |      MORE                                  |
                                    |_____|
```

Screen 0.11 -   List of SPREA System Names for the current System Type.

Screen 0.12 - System Description Menu with Mission Area, System
              Type, and System Name identified.

        From this menu, the user can select the Mission/Condition
        Set Name field or any of the previously selected fields.

        User Actions:
        1.   Mission Area.   Next screen is 0.7.

        2.   System Type.   Next screen is 0.9.

        3.   System Name. If the user has previously chosen to
             select a system from a Product 1 SPREA analysis, the
             next screen will be 0.11. If the user chose to
             identify a new system entirely from scratch, the next
             screen will be 0.22.

        4.   Mission/Condition Set Name. If the user has previously
             chosen to select a system from a Product 1 SPREA
             analysis, the next screen will be 0.13. If the user
             chose to identify a new system entirely from scratch,
             the next screen will be 0.24.

        <ESC> Returns the user to screen 0.5.

```
┌────────────────────────────────────────────────────────────────┐
│                      SYSTEM DESCRIPTION                         │
├────────────────────────────────────────────────────────────────┤
│                                                                │
│   1.   Mission Area: Aviation                                  │
│   2.   System Type: Utility Helicopters                        │
│   3.   System Name: UH-60 Black Hawk                           │
│   4.   Mission/Conditions Set Name:                            │
│                                                                │
└────────────────────────────────────────────────────────────────┘
```

Screen 0.12 -   **System Description Menu with Mission Area, System Type, and System Name identified.**

Screen 0.13 -   SPREA Mission/Condition Set file names for the
                current System Name.

From this screen, the user can select a Mission/Condition
Set file that was developed for the SPREA analysis, or view
the contents of a SPREA Mission/Condition Set file.

<u>User Actions:</u>

select   When the select command is highlighted the user
            can use normal menu selection procedures to choose
            one of the listed files as the Mission/Condition
            Set file for the Product 5 MDA analysis. Next
            screen is 0.21.

view   When the view command is highlighted, the user can
            use normal menu selection procedures to view the
            contents of one of the listed files. Next screen
            is 0.14.

<ESC>   Returns the user to screen 0.12.

<u>Input Files:</u>

SPREA Conditions by System Types file names.

...

```
┌─────────────────────────────────────────────────┐
│              SYSTEM DESCRIPTION                   │
├──────────────────────────────────────┬──────────┴──────────────────┐
│                                       │ SPREA MISSION/CONDITION SETS │
│                                       │ FOR:   UH-60 BLACK HAWK      │
│  1.   Mission Area: Aviation          ├──────────────────────────────┤
│  2.   System Type: Utility Helicopters│                              │
│  3.   System Name: UH-60 Black Hawk   │   1.   USNORMAL              │
│  4.   Mission/Conditions Set Name:    │   2.   USA1                 │
│                                       │   3.   EUROPE1              │
│                                       │   4.   EUROPE2              │
│                                       │   5.   MIDEAST1             │
│                                       │                              │
│                                       ├──────────────────────────────┤
│                                       │    select          view     │
└───────────────────────────────────────┴──────────────────────────────┘
```

Screen 0.13 -   **SPREA Mission/Condition Set file names for the current System Name.**

Screen 0.14 - SPREA Mission/Condition Set file menu.

From this screen, the user can choose to view typical or additional conditions for the system and mission identified in the SPREA analysis.

User Actions:

1. Typical Conditions. Next Screen is 0.15.

2. Additional Conditions. If Additional Conditions have been defined for the current system, the next Screen is 0.17. If no Additional Conditions have been defined for the current system, the next screen is 0.19.

<ESC> Returns the user to screen 0.13.

Input File:

Selected SPREA Conditions by System Type file.

```
┌─────────────────────────────────────────────────────┐
│              SPREA MISSION/CONDITION SET              │
├─────────────────────────────────────────────────────┤
│     File name:  USA1                                  │
│     System Type:  Utility Helicopter                  │
│     System Name:  UH-60 Black Hawk                    │
│     Mission:  Transport Combat Troops                 │
├─────────────────────────────────────────────────────┤
│                                                       │
│          1.  Typical Conditions                       │
│          2.  Additional Conditions                    │
│                                                       │
│                                                       │
└─────────────────────────────────────────────────────┘
```

Screen 0.14 -   SPREA Mission/Condition Set file menu.

Screen 0.15 - Typical Conditions menu for the selected
                Mission/Conditions Set file.

    From this screen the user can select a category of typical
    conditions to view.

    <u>User Actions:</u>
    The user will use normal menu selection procedures to select
    a typical conditions category from the list. The next
    screen is an example of the typical environmental conditions
    0.16.

    <ESC>   Returns the user to screen 0.14.

    <u>Input File:</u>
    Selected SPREA Conditions by System Type file.

```
┌─────────────────────────────────────────────────────┐
│              SPREA MISSION/CONDITION SET              │
├─────────────────────────────────────────────────────┤
│                                                       │
│   File name:  USA1                                    │
│   System Type:   Utility Helicopter                   │
│   System Name:   UH-60 Black Hawk                     │
│   Mission:  Transport Combat Troops                   │
├─────────────────────────────────────────────────────┤
│              TYPICAL CONDITIONS                       │
├─────────────────────────────────────────────────────┤
│                                                       │
│          1.  Environmental                            │
│          2.  Terrain                                  │
│          3.  Target/Threat Related                    │
│          4.  Friendly Force Related                   │
│                                                       │
└─────────────────────────────────────────────────────┘
```

Screen 0.15 -   **Typical Conditions menu for the selected
Mission/Conditions Set file.**

Screen 0.16 - Typical Conditions screen for the selected
               category.

     From this screen the user can view the parameters for the
     selected typical conditions category.

     <u>User Actions:</u>
     The only acceptable user action from this screen is the
     <ESC> key to return to the previous menu. The next screen
     is 0.15.

     <u>Input File:</u>
     Selected SPREA Conditions by System Type file.

```
+---------------------------------------------------+
|            SPREA MISSION/CONDITION SET            |
+---------------------------------------------------+
|                                                   |
|    File name:  USA1                               |
|    System Type:  Utility Helicopter               |
|    System Name:  UH-60 Black Hawk                 |
|    Mission:  Transport Combat Troops              |
+---------------------------------------------------+
|      TYPICAL ENVIRONMENTAL CONDITIONS             |
+---------------------------------------------------+
|                                                   |
|                                                   |
|    Day/Night:   night                             |
|    Visibility Type:  clear                        |
|    Flight Rules/Conditions:   VFR/VFC             |
|    Climate Type:  Basic/High Humid                |
|    Altitude:  5000 ft.                            |
|    Electromagnetic Hazards:   without             |
|                                                   |
+---------------------------------------------------+
```

Screen 0.16   **Typical Conditions Screen for the Selected**

                         Category

Screen 0.17 - Additional Conditions Menu. From this menu, the
               user can select an additional conditions category
               to view.

        User Actions:

        The user will use normal menu selection procedures to select
        an Additional Conditions category from the list. The next
        screen is an example of the additional environmental
        conditions screen 0.18.

        Pressing the <ESC> key will return the user to screen 0.15.

```
┌─────────────────────────────────────────────────┐
│           SPREA MISSION/CONDITION SET           │
├─────────────────────────────────────────────────┤
│                                                 │
│   File name:   USA1                             │
│   System Type:   Utility Helicopter             │
│   System Name:   UH-60 Black Hawk               │
│   Mission:   Transport Combat Troops            │
├─────────────────────────────────────────────────┤
│              ADDITIONAL CONDITIONS              │
├─────────────────────────────────────────────────┤
│                                                 │
│         1.  Environmental                       │
│         2.  Terrain                             │
│         3.  Target/Threat Related               │
│         4.  Friendly Force Related              │
│                                                 │
└─────────────────────────────────────────────────┘
```

Screen 0.17   **Additional Conditions Menu. From this menu, the user can select an additional conditions category to view.**

Screen 0.18 - Additional Conditions screen for the selected
category.

From this screen the user can view the parameters for the
selected additional conditions category.

<u>User Actions:</u>
The only acceptable user action from this screen is the
<ESC> key to return to the previous menu. The next screen
is 0.17.

<u>Input File:</u>
Selected SPREA Conditions by System Type file.

```
┌─────────────────────────────────────────────────────────┐
│              SPREA MISSION/CONDITION SET                  │
├─────────────────────────────────────────────────────────┤
│     File name:  USA1                                      │
│     System Type:  Utility Helicopter                     │
│     System Name:  UH-60 Black Hawk                       │
│     Mission:  Transport Combat Troops                    │
├─────────────────────────────────────────────────────────┤
│     ADDITIONAL ENVIRONMENTAL CONDITIONS                  │
├─────────────────────────────────────────────────────────┤
│   Special Environments: Mountain                         │
│   Wind Direction Type: Headwind                          │
│   Wind Direction-Measured (degrees): 0                   │
│   Wind Velocity (knots): 30                              │
│   Pressure (millibars): 1013                             │
│   Temperature(degrees): 40                               │
│   Precipitation: Rain                                    │
│   Visibility (meters): 1500                              │
└─────────────────────────────────────────────────────────┘
```

Screen 0.18 -   **Additional Conditions screen for the selected category.**

Screen 0.19 - No Additional Conditions message.

Displays when the user has selected to view Additional
Conditions from a Mission/Condition Set SPREA file and none
have been defined.

User Actions:
The only accepted user actions are pressing the <ENTER> or
<ESC> keys. Either action will return the user to screen
0.14.

```
┌─────────────────────────────────────────────────────┐
│              SPREA MISSION/CONDITION SET              │
├─────────────────────────────────────────────────────┤
│                                                       │
│   File name:  USA1                                    │
│   System Type:  Utility Helicopter                    │
│   System Name:  UH-60 Black Hawk                      │
│   Mission:  Transport Combat Troops                   │
│                                                       │
├─────────────────────────────────────────────────────┤
│   No Additional Conditions have been                  │
│         specified for this system                     │
│                                                       │
│        Press <ENTER> to Continue                      │
│                                                       │
└─────────────────────────────────────────────────────┘
```

Screen 0.19 -   No Additional Conditions message.

Screen 0.21 - System Description screen with Mission Area,
               System Type, System Name, and Mission/Condition
               Set Name identified.

From this screen, the user can modify any of the fields or
return to the Identify System menu.

<u>User Actions:</u>

1.   Mission Area - Next screen is 0.7.

2.   System Type - Next screen is 0.9.

3.   System Name - If the user has previously chosen to
      select a system from a Product 1 SPREA analysis, the
      next screen is 0.11. If the chose to identify a new
      system entirely from scratch, the next screen is 0.22.

4.   Mission/Condition Set Name - If the user has previously
      chosen to select a system from a Product 1 SPREA
      analysis, the next screen is 0.13. If the user chose
      to identify a new system entirely from scratch, the
      next screen is 0.24.

<ESC> Returns the user to the Identify System menu, 0.5.

```
┌─────────────────────────────────────────────────────────────┐
│                    SYSTEM DESCRIPTION                         │
├─────────────────────────────────────────────────────────────┤
│                                                               │
│   1.   Mission Area: Aviation                                 │
│   2.   System Type: Utility Helicopters                       │
│   3.   System Name: UH-60 Black Hawk                          │
│   4.   Mission/Conditions Set Name: USA1                      │
│                                                               │
└─────────────────────────────────────────────────────────────┘
```

**Screen 0.2ï -   System Description screen with Mission Area,
System Type, System Name, and Mission/Condition
Set Name identified.**

Screen 0.22 - System Description menu with a flashing cursor
                displayed in the System Name field.

    From this screen, the user can enter a system name for the
    current evaluation from the keyboard.

    User Actions:
    The system will wait for a string of allowable characters to
    be entered as the system name. The user will terminate the
    string by pressing the <ENTER> key. The system name must
    begin with an alpha character and can contain alpha,
    numeric, underscore, hyphen, and space characters.
    Characters in the System Name will be converted into a DOS
    file name via a collapsing algorithm (see below). If the
    System Name contains any characters that are not allowed, a
    tone will sound and an error message will display prompting
    the user with the rules for System Names. Next screen is
    0.23.

    <ESC> Returns the user to screen 0.10.

    Algorithms:
    The following algorithm will be used to collapse the System
    Name into a DOS file name:

        o   remove all space characters
        o   change everything to upper case
        o   remove all vowels
        o   remove characters at regular and predictable
             intervals until the name conforms to DOS file name
             rules

    If the file name that results from the collapse algorithm
    matches an existing file name, a message will be displayed
    prompting the user to change the System Name slightly.

```
┌─────────────────────────────────────────────────────┐
│                 SYSTEM DESCRIPTION                    │
├─────────────────────────────────────────────────────┤
│                                                       │
│   1.   Mission Area: Aviation                         │
│   2.   System Type: Utility Helicopters               │
│   3.   System Name: __                                │
│   4.   Mission/Conditions Set Name:                   │
│                                                       │
└─────────────────────────────────────────────────────┘
```

Screen 0.22 - **System Description menu with a flashing cursor displayed in the System Name field.**

Screen 0.23 -   System Description menu with Mission Area, System
                Type, and System Name identified.

From this screen, the user can select the Mission/Condition
Set Name field or any of the previously identified fields.

User Actions:
1.   Mission Area - Next screen is 0.7.

2.   System Type - Next screen is 0.9.

3.   System Name - Next screen is 0.22.

4.   Mission/Condition Set Name - Next screen is 0.24.
<ESC> Returns the user to screen 0.5.

```
 _____
|                 SYSTEM DESCRIPTION                |
|_____|
|                                                   |
|   1.   Mission Area: Aviation                     |
|   2.   System Type: Utility Helicopters           |
|   3.   System Name: UH-60 Black Hawk              |
|   4.   Mission/Conditions Set Name:               |
|                                                   |
|_____|
```

Screen 0.23 -   System Description menu with Mission Area, System Type, and System Name identified.

Screen 0.24 - List of Current Mission/Condition Set files for
               the identified System Name.

          From this screen, the user can use normal (generic) menu
          selection strategies to select, insert, modify, copy, or
          delete a Mission/Condition Set file (see section 3.3).

          User Actions:
          select   When the select command is highlighted, the user
                    can use normal selection procedures to choose one
                    of the listed files as the Mission/Condition Set
                    file for this analysis. Next screen is 0.21.

          insert   When the insert command is highlighted, the user
                    can use normal strategies to choose the file name
                    after which a new file name will be inserted.
                    Next screen is 0.25.

          modify   When the modify command is highlighted, the user
                    can use normal strategies to choose a file name
                    for which the user wants to modify current
                    mission/condition parameters. Next screen 0.30.

          copy   When the copy command is highlighted, the user can
                    use normal scrategies to choose a file name to
                    copy. Next screen is 0.40.

          delete   When the delete command is highlighted, the user
                    can use normal strategies to choose a file name to
                    delete from the disk storage. Next screen is
                    0.42.
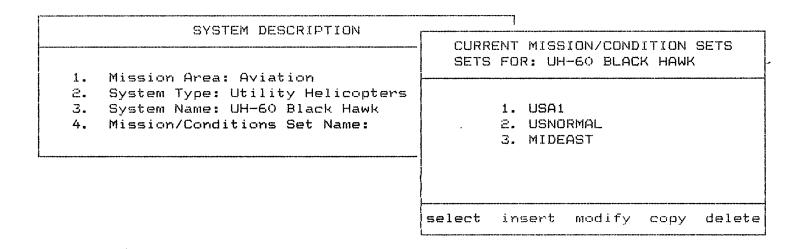
          <ESC>   Returns the user to screen 0.23.

<u>Input Files:</u>

Mission/Condition Set files that have been developed for the
current system name.

```
+--------------------------------------------------+
|               SYSTEM DESCRIPTION                 |
|--------------------------------------------------+-----------------------------------+
|                                                  | CURRENT MISSION/CONDITION SETS    |
|  1.   Mission Area: Aviation                     | SETS FOR: UH-60 BLACK HAWK        |
|  2.   System Type: Utility Helicopters           |-----------------------------------|
|  3.   System Name: UH-60 Black Hawk              |                                   |
|  4.   Mission/Conditions Set Name:               |       1.  USA1                    |
|                                                  |       2.  USNORMAL                |
|                                                  |       3.  MIDEAST                 |
|                                                  |                                   |
|                                                  |                                   |
|                                                  |                                   |
|                                                  |-----------------------------------|
|                                                  | select  insert  modify  copy  delete |
+--------------------------------------------------+-----------------------------------+
```

Screen 0.24 -   List of Current Mission/Condition Set files for the identified System Name.

Screen 0.25 -   List of Mission/Condition Set files for the
                current system name with a flashing cursor
                indicating an insertion point for a new file name.

From this screen, the user can enter a new Mission/Condition
Set file name.

<u>User Actions:</u>
The system will wait for a string of allowable characters to
be entered as the new Mission/Condition Set file name. The
user will terminate the string by pressing the <ENTER> key.
The file name must begin with an alpha character and can
contain up to eight alpha, numeric, underscore, and hyphen
characters. All characters beyond the first eight will be
truncated. If the Mission/Condition Set file name contains
any characters that are not allowed, a tone will sound and
an error message will display prompting the user with the
rules for Mission/Condition Set names. Next screen is 0.26.

<ESC> Returns the user to screen 0.24.

```
┌──────────────────────────────────────────────────┐
│                SYSTEM DESCRIPTION                  │
├────────────────────────────────────┬──────────────┴───────────────────────┐
│                                     │    CURRENT MISSION/CONDITION SETS     │
│                                     │    SETS FOR: UH-60 BLACK HAWK         │
│   1.   Mission Area: Aviation       ├───────────────────────────────────────┤
│   2.   System Type: Utility Helicopters │                                   │
│   3.   System Name: UH-60 Black Hawk │        1.  USA1                       │
│   4.   Mission/Conditions Set Name: │        2.  -                           │
│                                     │        3.  USNORMAL                    │
│                                     │        4.  MIDEAST                     │
│                                     │                                        │
│                                     │                                        │
│                                     ├───────────────────────────────────────┤
│                                     │ select   insert   modify   copy   delete │
└─────────────────────────────────────┴───────────────────────────────────────┘
```

**Screen 0.25 -   List of Mission/Condition Set files for the
current system name with a flashing cursor
indicating an insertion point for a new file name.**

Screen 0.26 - Mission/Condition Set Definition menu.

From this screen, the user can choose to identify the
Mission, the typical conditions, and/or the additional
conditions for this evaluation.

User Actions:
1.   Mission - Next screen is 0.27.

2.   Typical Conditions - Next screen is 0.31.

3.   Additional Conditions - Next screen is 0.36.

<ESC> Returns the user to screen 0.32.

```
┌─────────────────────────────────────────────────────┐
│          MISSION/CONDITION SET DEFINITION             │
├─────────────────────────────────────────────────────┤
│                                                       │
│     Name:  USA1                                       │
│     System Type:   Utility Helicopter                 │
│     System Name:   UH-60 Black Hawk                   │
├─────────────────────────────────────────────────────┤
│                                                       │
│   1. Mission:                                         │
│   2. Typical Conditions                               │
│   3. Additional Conditions                            │
│                                                       │
└─────────────────────────────────────────────────────┘
```

Screen 0.26 -   Mission/Condition Set Definition menu.

Screen 0.27 - Mission/Condition Set Definition menu with
                "select" and "type-in" commands displayed.

From this screen, the user can choose to type in a mission
name or select one from a list of missions for the current
System Type.

User Actions:

select   Next screen is 0.28.

type-in   Next screen is 0.29.

<ESC> Returns the user to screen 0.26.

```
┌─────────────────────────────────────────────────────┐
│           MISSION/CONDITION SET DEFINITION           │
├─────────────────────────────────────────────────────┤
│                                                       │
│     Name:   USA1                                      │
│     System Type:   Utility Helicopter                 │
│     System Name:   UH-60 Black Hawk                   │
├─────────────────────────────────────────────────────┤
│                                                       │
│   1. Mission:                                         │
│   2. Typical Conditions                               │
│   3. Additional Conditions                            │
│                                                       │
├─────────────────────────────────────────────────────┤
│        select                      type-in            │
└─────────────────────────────────────────────────────┘
```

Screen 0.27   **Mission/Condition Set Definition Menu**

Screen 0.28 - List of missions for the identified System Type.

From this screen, the user can select a mission for this
evaluation.

User Actions:
The user will use normal selection procedures to choose a
mission name from the displayed list. Next screen is 0.30.

<ESC> Returns the user to screen 0.27.
Input File:
Product 5 Missions by System Type Taxonomy file.

```
┌─────────────────────────────────────────────────┐
│        MISSION/CONDITION SET DEFINITION          │
├───────────────────────────────────────┬─────────┘
│      Name:   USA1         ┌────────────┴──────────────────────┐
│      System Type:         │      Utility Helicopter Missions   │
│      System Name:         ├────────────────────────────────────┤
│                           │                                    │
│                           │   1.  Transport Combat Troops      │
│   1.  Mission:            │   2.  Transport Logistical Supplies│
│   2.  Typical Condi       │   3.  Evacuate Casualties          │
│   3.  Additional Co       │   4.                               │
│                           │   5.                               │
│                           │                                    │
│        select             │                                    │
└───────────────────────────┴────────────────────────────────────┘
```

Screen 0.28 -   List of missions for the identified System Type.

Screen 0.29 - Mission/Condition Set Definition menu with a
                flashing cursor displayed in the mission field.

From this screen, the user can enter a mission name for this
evaluation.

<u>User Actions:</u>
The user will enter a string of characters to describe the
current mission. The string will be terminated by pressing
the <ENTER> key. The next screen is 0.30.

<ESC> Returns the user to screen 0.27.

```
┌─────────────────────────────────────────────────────────┐
│            MISSION/CONDITION SET DEFINITION               │
├─────────────────────────────────────────────────────────┤
│                                                           │
│     Name:   USA1                                          │
│     System Type:    Utility Helicopter                    │
│     System Name:    UH-60 Black Hawk                      │
│                                                           │
├─────────────────────────────────────────────────────────┤
│                                                           │
│     1. Mission: ▁                                         │
│     2. Typical Conditions                                 │
│     3. Additional Conditions                              │
│                                                           │
├─────────────────────────────────────────────────────────┤
│         select                        type-in             │
└─────────────────────────────────────────────────────────┘
```

Screen 0.29 - **Mission/Condition Set Definition menu with a flashing cursor displayed in the mission field.**

Screen 0.30 - Mission/Condition Set Definition menu with the mission identified.

From this screen, the user can choose to identify typical conditions, additional conditions, or change the mission name.

User Actions:

1.   Mission - Next screen is 0.27.

2.   Typical Conditions - Next screen is 0.31.

3.   Additional Conditions - Next screen is 0.36.

<ESC> Next screen 0.32.

```
┌─────────────────────────────────────────────────────┐
│           MISSION/CONDITION SET DEFINITION            │
├─────────────────────────────────────────────────────┤
│                                                       │
│      Name:  USA1                                      │
│      System Type:   Utility Helicopter                │
│      System Name:   UH-60 Black Hawk                  │
├─────────────────────────────────────────────────────┤
│                                                       │
│   1. Mission: Transport Combat Troops                 │
│   2. Typical Conditions                               │
│   3. Additional Conditions                            │
│                                                       │
│                                                       │
└─────────────────────────────────────────────────────┘
```

**Screen 0.30 -   Mission/Condition Set Definition menu with the
mission identified.**

Screen 0.31 - Mission/Condition Set Definition - Typical
Conditions menu.

From this screen, the user can select a category of typical
conditions to view/modify.

<u>User Actions:</u>

The user can use normal menu selection procedures to choose
a category of typical conditions. The next screen (0.32) is
an example of the Typical Environmental Conditions screen.
The screens from the other category selections present the
conditions for each category in the same format. The
screens for each Typical Conditions category have default
conditions highlighted.

<ESC> Returns the user to screen 0.30.

<u>Input Files:</u>

The Product 5 Conditions by System Type Taxonomy. See
Section 4.

```
+---------------------------------------------------+
|          MISSION/CONDITION SET DEFINITION         |
+---------------------------------------------------+
|                                                   |
|   Name:  USA1                                     |
|   System Type:   Utility Helicopter               |
|   System Name:   UH-60 Black Hawk                 |
+---------------------------------------------------+
|                TYPICAL CONDITIONS                 |
+---------------------------------------------------+
|                                                   |
|                                                   |
|       1. Environmental                            |
|       2. Terrain                                  |
|       3. Target/Threat Related                    |
|       4. Friendly Force Related                   |
|                                                   |
+---------------------------------------------------+
```

Screen 0.31 -   Mission/Condition Set Definition - Typical Conditions menu.

Screen 0.32 - Mission/Condition Set Definition - Typical
Environmental Conditions menu.

From this screen, the user can select environmental
categories to modify conditions for each category.

<u>User Actions:</u>
Using normal menu selection procedures, the user will select
a category for which he or she wants to change the
conditions parameter. If the parameter for the selected
field is one that can be selected from the conditions
taxonomy, the user is presented with a list of the possible
choices. The next screen (0.33) is an example of the
condition parameters screen for the "Visibility Type"
category. The screens from the other category selections
present parameters for each category in the same format.
The screens for each category have default or current
conditions highlighted.

If the user selects a field from the Typical Environmental
Conditions menu that must be input by the user, a flashing
cursor will be displayed in that field. Screen 0.34 is an
example of this kind of input.

<ESC> Returns the user to screen 0.31.

<u>Input Files:</u>
Product 5 Conditions by System Type Taxonomy.

```
+-------------------------------------------------------------+
|            MISSION/CONDITION SET DEFINITION                 |
+-------------------------------------------------------------+
|                                                             |
|      Name:   USA1                                           |
|      System Type:   Utility Helicopter                      |
|      System Name:   UH-60 Black Hawk                        |
+-------------------------------------------------------------+
|          TYPICAL ENVIRONMENTAL CONDITIONS                   |
+-------------------------------------------------------------+
|                                                             |
|      1. Day/Night:   night                                  |
|      2. Visibility Type:   clear                            |
|      3. Flight Rules/Conditions:   VFR/VFC                  |
|      4. Climate Type:   Basic/High Humid                    |
|      5. Altitude:   5000 ft.                                |
|      6. Electromagnetic Hazards:   without                  |
|                                                             |
+-------------------------------------------------------------+
```

Screen 0.32 -   **Mission/Condition Set Definition - Typical Environmental Conditions menu.**

Screen 0.33 - Visibility Type menu.

This is an example of how the parameters for each environmental conditions category is displayed. From this screen, the user can choose a category parameter.

User Actions:
The user can use normal procedures to select a parameter from the list. Next screen is 0.32. If the user selects the "other" option (which appears on all parameter category menus) he or she can type in a new condition parameter. Next screen 0.35.

<ESC> Returns the user to 0.32.

Input Files:
Product 5 Conditions by System Type Taxonomy.

```
┌─────────────────────────────────────────────────────┐
│           MISSION/CONDITION SET DEFINITION            │
├─────────────────────────────────────────────────────┤
│                                                       │
│    Name:  USA1                                        │
│    System Type:   Utility Helicopter                  │
│    System Name:   UH-60 Black Hawk                    │
├─────────────────────────────────────────────────────┤
│    TYPICAL ENVIRONMENTAL CONDITIONS                   │
├────────────────────────────────────┬────────────────┐
│                                     │ VISIBILITY TYPE │
│   1.  Day/Night:   night            │                 │
│   2.  Visibility Type:  clear       │                 │
│   3.  Flight Rules/Conditions:  VF  │  1.  clear      │
│   4.  Climate Type:  Basic/High Hu  │  2.  fog        │
│   5.  Altitude:  5000 ft.           │  3.  haze       │
│   6.  Electromagnetic Hazards:  wi  │  4.  smoke      │
│                                     │  5.  other      │
└─────────────────────────────────────┴────────────────┘
```

Screen 0.33 -   Visibility Type menu.

Screen 0.34 - Mission/Condition Set Definition - Typical
Environmental Conditions menu with a flashing
cursor in the "Altitude:" field.

From this screen, the user can enter a value representing
the expected altitude in which the system under evaluation
must perform to accomplish the mission.

User Actions:
For each field that requires user input to establish the
condition parameter, the system will wait for the
appropriate input. For example, in this case, the system
will wait for numeric characters that represent the number
of feet of altitude. The user will terminate the input by
pressing the <ENTER> key. If the input is not the
appropriate character type (alpha or numeric) the system
will display an error message. Next screen is 0.32.

<ESC> Returns the user to screen 0.32 and replaces the
previous value.

```
┌─────────────────────────────────────────────────────────────┐
│              MISSION/CONDITION SET DEFINITION                 │
├─────────────────────────────────────────────────────────────┤
│                                                               │
│      Name:   USA1                                             │
│      System Type:   Utility Helicopter                        │
│      System Name:   UH-60 Black Hawk                          │
├─────────────────────────────────────────────────────────────┤
│          TYPICAL ENVIRONMENTAL CONDITIONS                     │
├─────────────────────────────────────────────────────────────┤
│                                                               │
│      1.  Day/Night:   night                                   │
│      2.  Visibility Type: smog                                │
│      3.  Flight Rules/Conditions:   VFR/VFC                   │
│      4.  Climate Type:   Basic/High Humid                     │
│      5.  Altitude:  __                                        │
│      6.  Electromagnetic Hazards:   without                   │
│                                                               │
└─────────────────────────────────────────────────────────────┘
```

Screen 0.34 -   **Mission/Condition Set Definition - Typical Environmental Conditions menu with a flashing cursor in the "Altitude:" field.**

Screen 0.35 - Visibility Type menu with a flashing cursor
displayed in a blank parameter field.

From this screen, the user can enter a condition parameter
not shown as a menu option.

<u>User Actions:</u>
The user will use the normal editing keys to enter a string
of characters that will be used as the new condition
parameter. Pressing the <ENTER> key will terminate the
input. Next screen 0.32.

<ESC> Returns the user to screen 0.32.

```
┌────────────────────────────────────────────────────────┐
│              MISSION/CONDITION SET DEFINITION           │
├────────────────────────────────────────────────────────┤
│                                                         │
│     Name:   USA1                                        │
│     System Type:   Utility Helicopter                   │
│     System Name:   UH-60 Black Hawk                     │
├────────────────────────────────────────────────────────┤
│       TYPICAL ENVIRONMENTAL CONDITIONS                  │
├──────────────────────────────────────┬─────────────────┤
│                                       │ VISIBILITY TYPE │
│   1.  Day/Night:   night              ├─────────────────┤
│   2.  Visibility Type:   clear        │                 │
│   3.  Flight Rules/Conditions:   VF   │ 1.  clear       │
│   4.  Climate Type:   Basic/High Hu   │ 2.  fog         │
│   5.  Altitude:   5000 ft.            │ 3.  haze·       │
│   6.  Electromagnetic Hazards:   wi   │ 4.  smoke       │
│                                       │ 5.  —           │
└───────────────────────────────────────┤                 │
                                        └─────────────────┘
```

Screen 0.35 -   **Visibility Type menu with a flashing cursor displayed in a blank parameter field.**

Screen 0.36 - Mission/Condition Set Definition - Additional
              Conditions menu.

        From this screen, the user can select a category of
        additional conditions to view/modify.

        User Actions:
        The user can use normal menu selection procedures to choose
        a category of additional conditions. The next screen (0.37)
        is an example of the Additional Environmental Conditions
        screen. The screens from the other category selections
        present the conditions for each category in the same format.
        The screens for each Additional Conditions category have
        default conditions highlighted.

        <ESC> Returns the user to screen 0.30.

        Input Files:
        The Product 5 Conditions by System Type Taxonomy. See
        Section 4.

```
┌─────────────────────────────────────────────┐
│          MISSION/CONDITION SET DEFINITION     │
├─────────────────────────────────────────────┤
│                                               │
│   Name:   USA1                                │
│   System Type:   Utility Helicopter           │
│   System Name:   UH-60 Black Hawk             │
├─────────────────────────────────────────────┤
│            ADDITIONAL CONDITIONS              │
├─────────────────────────────────────────────┤
│                                               │
│        1. Environmental                       │
│        2. Terrain                             │
│        3. Target/Threat Related               │
│        4. Friendly Force Related              │
│                                               │
└─────────────────────────────────────────────┘
```

Screen 0.36 -   **Mission/Condition Set Definition - Additional Conditions menu.**

Screen 0.37 - Mission/Condition Set Definition - Additional
              Environmental Conditions menu.

From this screen, the user can select environmental
categories to modify conditions for each category.

User Actions:
Using normal menu selection procedures, the user will select
a category for which he or she wants to change the
conditions parameter. If the parameter for the selected
field is one that can be selected from the conditions
taxonomy, the user is presented with a list of the possible
choices. The next screen (0.38) is an example of the
condition parameters screen for the "Wind Direction Type"
category. The screens from the other category selections
present parameters for each category in the same format.
The screens for each category have default or current
conditions highlighted.

If the user selects a field from the Additional
Environmental Conditions menu that must be input by the
user, such as the temperature or wind velocity, a flashing
cursor will be displayed in that field. Screen 0.39 is an
example of this kind of input.

<ESC> Returns the user to screen 0.36.

Input Files:
Product 5 Conditions by System Type Taxonomy.

```
+----------------------------------------------------+
|           MISSION/CONDITION SET DEFINITION         |
+----------------------------------------------------+
|                                                    |
|     Name:   USA1                                   |
|     System Type:   Utility Helicopter              |
|     System Name:   UH-60 Black Hawk                |
+----------------------------------------------------+
|     ADDITIONAL ENVIRONMENTAL CONDITIONS            |
+----------------------------------------------------+
|   Special Environments: Mountain                   |
|   Wind Direction Type: Headwind                    |
|   Wind Direction-Measured (degrees): 0             |
|   Wind Velocity (knots): 30                        |
|   Pressure (millibars): 1013                       |
|   Temperature(degrees): 40                         |
|   Precipitation: Rain                              |
|   Visibility (meters): 1500                        |
+----------------------------------------------------+
```

Screen 0.37 -   Mission/Condition Set Definition - Additional
                  Environmental Conditions menu.

Screen 0.38 - Wind Direction Type menu.

This is an example of how the parameters for each
environmental conditions category is displayed. From this
screen, the user can choose a category parameter.

User Actions:
The user can use normal procedures to select a parameter
from the list. Next screen is 0.37. If the user selects
the "other" option (which appears on all parameter category
menus) he or she can type in a new condition parameter.
Next screen 0.39.

<ESC> Returns the user to 0.37.

Input Files:
Product 5 Conditions by System Type Taxonomy.

```
┌──────────────────────────────────────────────────────┐
│           MISSION/CONDITION SET DEFINITION             │
├──────────────────────────────────────────────────────┤
│                                                        │
│     Name:  USA1                                        │
│     System Type:   Utility Helicopter                  │
│     System Name:   UH-60 Black Hawk                    │
├──────────────────────────────────────────────────────┤
│     ADDITIONAL ENVIRONMENTAL CONDITIONS                │
├──────────────────────────────────────────────────────┤
│     Special Environments: Mountain                     │
│     Wind Direction Type: Headwind                      │
│     Wind Direction-Measured (degrees): 0               │
│     Wind Velocity (knots): 30         ┌────────────────────────────┐
│     Pressure (millibars): 1013        │   WIND DIRECTION TYPE      │
│     Temperature(degrees): 40          ├────────────────────────────┤
│     Precipitation: Rain               │     1.  Headwind           │
│     Visibility (meters): 1500         │     2.  Tailwind           │
└───────────────────────────────────────│     3.  Cross wind         │
                                        │     4.  No wind            │
                                        │     5.  Other              │
                                        └────────────────────────────┘
```

Screen 0.38 -   Wind Direction Type menu.

Screen 0.39 - Wind Direction Type menu with a flashing cursor
               displayed in a blank parameter field.

From this screen, the user can enter a condition parameter
not shown as a menu option.

User Actions:
The user will use the normal editing keys to enter a string
of characters that will be used as the new condition
parameter. Pressing the <ENTER> key will terminate the
input. Next screen 0.37.

<ESC> Returns the user to screen 0.37.

```
+---------------------------------------------------+
|           MISSION/CONDITION SET DEFINITION        |
+---------------------------------------------------+
|                                                   |
|    Name:   USA1                                   |
|    System Type:   Utility Helicopter              |
|    System Name:   UH-60 Black Hawk                |
+---------------------------------------------------+
|    ADDITIONAL ENVIRONMENTAL CONDITIONS            |
+---------------------------------------------------+
|    Special Environments: Mountain                 |
|    Wind Direction Type: Headwind                  |
|    Wind Direction-Measured (degrees): 0           |
|    Wind Velocity (knots): 30          +---------------------------------+
|    Pressure (millibars): 1013         |    WIND DIRECTION TYPE          |
|    Temperature(degrees): 40           +---------------------------------+
|    Precipitation: Rain  :             |    1.  Headwind                 |
|    Visibility (meters): 1500          |    2.  Tailwind                 |
+---------------------------------------+    3.  Cross wind               |
                                        |    4.  No wind                  |
                                        |    5.  —                        |
                                        +---------------------------------+
```

Screen 0.39 -   **Wind Direction Type menu with a flashing cursor displayed in a blank parameter field.**

Screen 0.40 - List of Mission/Condition Set files for the
               current System Name with a flashing cursor in the
               space below the file to be copied.

From this screen, the user can enter a new name for the
copied file.

<u>User Actions:</u>
The system will wait for a string of allowable characters to
be entered as the copied Mission/Condition Set file name.
The user will terminate the string by pressing the <ENTER>
key. The file name must begin with an alpha character and
can contain up to eight alpha, numeric, underscore, and
hyphen characters. All characters beyond the first eight
will be truncated. If the Mission/Condition Set file name
contains any characters that are not allowed, a tone will
sound and an error message will display prompting the user
with the rules for naming Mission/Condition set files. Next
screen is 0.41.

<ESC> Returns the user to screen 0.23.

<u>Input Files:</u>
Product 5 Mission/Condition Set files.

```
┌─────────────────────────────────────────────┐
│            SYSTEM DESCRIPTION                │
│                                    ┌─────────┴──────────────────────────┐
│─────────────────────────────────  │  CURRENT MISSION/CONDITION SETS     │
│                                    │  SETS FOR: UH-60 BLACK HAWK         │
│  1.   Mission Area: Aviation       │─────────────────────────────────── │
│  2.   System Type: Utility Helicopters                                   │
│  3.   System Name: UH-60 Black Hawk│       1.  USA1                      │
│  4.   Mission/Conditions Set Name: │       2.  ─                         │
│                                    │       3.  USNORMAL                  │
│                                    │       4.  MIDEAST                   │
└────────────────────────────────────│                                     │
                                     │                                     │
                                     │─────────────────────────────────── │
                                     │ select  insert  modify  copy  delete│
                                     └─────────────────────────────────────┘
```

Screen 0.40 -   **List of Mission/Condition Set files for the current System Name with a flashing cursor in the space below the file to be copied.**

3-102

Screen 0.41 - List of Mission/Condition Set files with the
               copied file name inserted after the source file.

From this screen, the user can use normal selection
procedures to initiate any of the available commands.

<u>User Actions:</u>
See the description of user actions for screen 0.24.

```
┌──────────────────────────────────────────────────┐
│              SYSTEM DESCRIPTION         ┌──────────┴──────────────────────────┐
│─────────────────────────────────────────│  CURRENT MISSION/CONDITION SETS     │
│                                         │  SETS FOR: UH-60 BLACK HAWK         │
│  1.   Mission Area: Aviation            │                                     │
│  2.   System Type: Utility Helicopters  │                                     │
│  3.   System Name: UH-60 Black Hawk     │     1.  USA1                        │
│  4.   Mission/Conditions Set Name:      │     2.  USA2                        │
│                                         │     3.  USNORMAL                    │
│                                         │     4.  MIDEAST                     │
└─────────────────────────────────────────│                                     │
                                          │                                     │
                                          │─────────────────────────────────────│
                                          │ select   insert   modify   copy   delete │
                                          └──────────────────────────────────────┘
```

Screen 0.41 -   **List of Mission/Condition Set files with the
copied file name inserted after the source file.**

Screen 0.42 - Message requiring the user to confirm the delete
            operation.
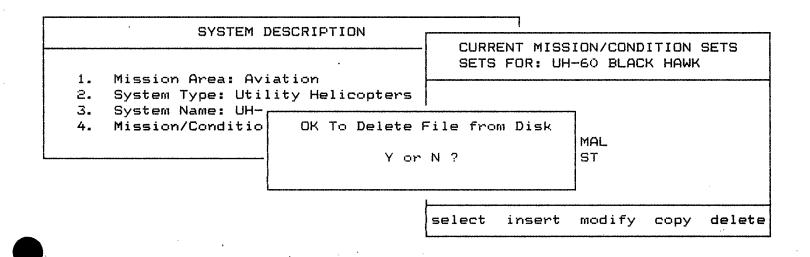
From this screen, the user can either confirm or cancel the
delete request.

<u>User Actions:</u>

y   causes the deletion of the currently highlighted
      Mission/Condition Set file. Next screen is 0.43.

n   cancels the delete request. Next screen is 0.24.

<ESC> cancels the delete request. Next screen is 0.24.

```
┌─────────────────────────────────────────┐
│             SYSTEM DESCRIPTION          ┌┴──────────────────────────────────┐
├──────────────────────────────────────┐  │  CURRENT MISSION/CONDITION SETS    │
│                                      │  │   SETS FOR: UH-60 BLACK HAWK       │
│   1.   Mission Area: Aviation        │  ├────────────────────────────────────┤
│   2.   System Type: Utility Helicopters │                                    │
│   3.   System Name: UH─┌─────────────────────────────────┐                   │
│   4.   Mission/Conditio│  OK To Delete File from Disk    │                   │
│                        │                              MAL│                   │
└────────────────────────│       Y or N ?               ST │                   │
                         │                                 │                   │
                         └─────────────────────────────────┘                   │
                          ├────────────────────────────────────────────────────┤
                          │ select   insert   modify   copy   delete           │
                          └────────────────────────────────────────────────────┘
```

Screen 0.42 -   **Message requiring the user to confirm the delete operation.**
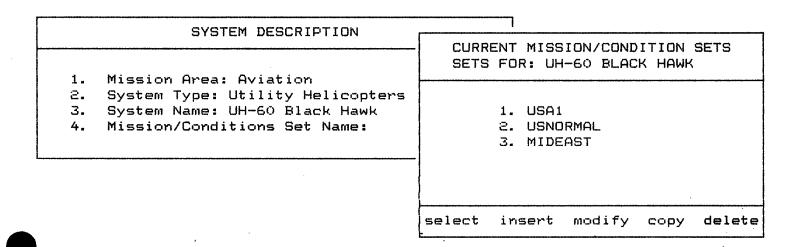
Screen 0.43 - List of Mission/Condition Set files with the
deleted file removed.

From this screen, the user can use normal selection
procedures to initiate any of the available commands.

<u>User Actions:</u>
See the description of user actions for screen 0.24.

```
┌─────────────────────────────────────────────┐
│              SYSTEM DESCRIPTION              │
├──────────────────────────────┬──────────────┴──────────────────────┐
│                              │   CURRENT MISSION/CONDITION SETS      │
│                              │   SETS FOR: UH-60 BLACK HAWK          │
│   1.   Mission Area: Aviation├──────────────────────────────────────┤
│   2.   System Type: Utility Helicopters                             │
│   3.   System Name: UH-60 Black Hawk   1.  USA1                     │
│   4.   Mission/Conditions Set Name:    2.  USNORMAL                 │
│                              │         3.  MIDEAST                   │
│                              │                                      │
│                              │                                      │
│                              ├──────────────────────────────────────┤
│                              │ select   insert   modify   copy   delete │
└──────────────────────────────┴──────────────────────────────────────┘
```

Screen 0.43   **List of Mission/Condition Set Files**

Screen 0.50 - Resume MDA Analysis menu.

From this screen, the user can type-in or select the System
Name and the Mission/Condition Set name for which to resume
analysis activities.

User Actions:

1. System name - When "type-in" is the highlighted
    command, a flashing cursor will be displayed in the
    system name field. Next screen is 0.51. When "select"
    is the highlighted command, the system will display a
    list of currently saved System Names. Next screen is
    0.52.

2. Mission/Condition Set name - When this field is
    selected and the user has not identified the system
    name, a tone will sound and an error message will be
    displayed indicating that the system name must be
    entered first.

<ESC> Returns the user to screen 0.3.

Input Files:
Product 5 System Files. Product 5 Mission/Condition Set
Files.

```
┌─────────────────────────────────────────────────────────┐
│                 RESUME MDA ANALYSIS                      │
├─────────────────────────────────────────────────────────┤
│                                                          │
│   1. System name:                                        │
│   2. Mission/Condition Set name:                         │
│                                                          │
│                                                          │
├─────────────────────────────────────────────────────────┤
│        type-in              select                       │
│                                                          │
└─────────────────────────────────────────────────────────┘
```

Screen 0.50 -   Resume MDA Analysis menu.

Screen 0.51 - Resume MDA Analysis menu with flashing cursor
                displayed in the System name field.

From this screen, the user can type-in the name of the
system for which he or she wants to resume the analysis.

<u>User Actions:</u>
The user will use normal editing keys and procedures to
enter the system name. Input will be terminated by pressing
the <ENTER> key. Next screen 0.53. If the name that the
user enters does not exist on the current storage medium, an
error message indicating such will display. Next screen
0.50.

<ESC> Returns the user to screen 0.50.

<u>Input Files:</u>
Product 5 System Files.

```
┌─────────────────────────────────────────────────────────┐
│                    RESUME  MDA  ANALYSIS                  │
├─────────────────────────────────────────────────────────┤
│                                                           │
│   1.  System name:   ▁                                    │
│   2.  Mission/Condition Set name:                         │
│                                                           │
│                                                           │
├─────────────────────────────────────────────────────────┤
│            type-in              select                    │
└─────────────────────────────────────────────────────────┘
```

Screen 0.51 -   Resume MDA Analysis menu with flashing cursor
                   displayed in the System name field.

Screen 0.52 - List of current System Names.

From this screen, the user can select a system name for which to resume the analysis.

<u>User Actions:</u>
Using normal selection procedures, the user will choose a system name from the list for the analysis. Next screen is 0.53.
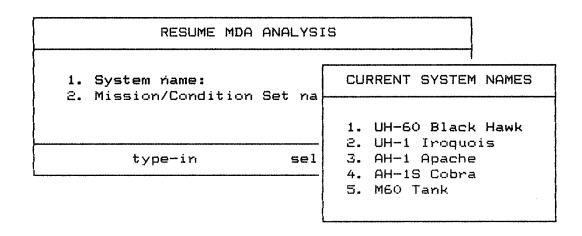
<ESC> Returns the user to screen 0.50.

<u>Input Files:</u>
Product 5 System Files.

```
┌─────────────────────────────────────────────┐
│             RESUME MDA ANALYSIS             │
├──────────────────────────────────┬──────────┘
│  1. System name:                 │  CURRENT SYSTEM NAMES
│  2. Mission/Condition Set na     │
│                                  │  1. UH-60 Black Hawk
│                                  │  2. UH-1 Iroquois
├──────────────────────────────────┤  3. AH-1 Apache
│        type-in          sel      │  4. AH-1S Cobra
└──────────────────────────────────┘  5. M60 Tank
```

Screen 0.52   List of Current System Names

Screen 0.53 - Resume MDA Analysis with System Name identified.

From this screen, the user can choose to type-in or select a Mission/Condition Set file name for the analysis or change the System Name.

<u>User Actions:</u>
1. System name - When "type-in" is the highlighted command, a flashing cursor will be displayed in the system name field. Next screen is 0.51. When "select" is the highlighted command, the system will display a list of currently saved System Names. Next screen is 0.52.

2. Mission/Condition Set name - When "type-in" is the highlighted command, the system will display a flashing cursor in the Mission/Condition Set name field. Next screen is 0.54. When "select" is the highlighted command, the system will display a list of the currently saved Mission/Condition Set files for the identified System Name. Next screen is 0.58.

<ESC> Returns the user to screen 0.3.

```
┌─────────────────────────────────────────────────────┐
│              RESUME MDA ANALYSIS                      │
├─────────────────────────────────────────────────────┤
│                                                       │
│   1. System name:  UH-60 Black Hawk                   │
│   2. Mission/Condition Set name:                      │
│                                                       │
│                                                       │
├─────────────────────────────────────────────────────┤
│         type-in              select                   │
└─────────────────────────────────────────────────────┘
```

Screen 0.53 -   Resume MDA Analysis with System Name identified.

Screen 0.54 - Resume MDA Analysis menu with flashing cursor
                displayed in the Mission/Condition Set name field.

From this screen, the user can type-in the name of the
Mission/Condition Set file name for the resumed analysis.

<u>User Actions:</u>
The user will use normal editing keys and procedures to
enter the file name. Input will be terminated by pressing
the <ENTER> key. Next screen 0.56. If the name that the
user enters does not exist on the current storage medium, an
error message indicating such will display. Next screen
0.53.

<ESC> Returns the user to screen 0.53.

```
┌─────────────────────────────────────────────────┐
│              RESUME MDA ANALYSIS                  │
├─────────────────────────────────────────────────┤
│                                                   │
│   1. System name:  UH-60 Black Hawk               │
│   2. Mission/Condition Set name: _                │
│                                                   │
│                                                   │
├─────────────────────────────────────────────────┤
│         type-in              select               │
└─────────────────────────────────────────────────┘
```

Screen 0.54 -   Resume MDA Analysis menu with flashing cursor
displayed in the Mission/Condition Set name field.

Screen 0.56 – Resume MDA Analysis menu with the System and the Mission/Condition Set names identified.

From this screen, the user can modify either the System name or the Mission/Condition Set name or return to the MDA Flowchart menu.

User Actions:

1. System name – When "type-in" is the highlighted command, a flashing cursor will be displayed in the system name field. Next screen is 0.51. When "select" is the highlighted command, the system will display a list of currently saved System Names. Next screen is 0.52.

2. Mission/Condition Set name – When "type-in" is the highlighted command, the system will display a flashing cursor in the Mission/Condition Set name field. Next screen is 0.54. When "select" is the highlighted command, the system will display a list of the currently saved Mission/Condition Set files for the identified System Name. Next screen is 0.58.

<ESC> Returns the user to screen 0.3.

```
┌─────────────────────────────────────────────────┐
│              RESUME MDA ANALYSIS                 │
├─────────────────────────────────────────────────┤
│                                                  │
│   1. System name:   UH-60 Black Hawk             │
│   2. Mission/Condition Set name:   USA1          │
│                                                  │
│                                                  │
├─────────────────────────────────────────────────┤
│         type-in              select              │
└─────────────────────────────────────────────────┘
```

Screen 0.56 -   **Resume MDA Analysis menu with the System and the Mission/Condition Set names identified.**

Screen 0.58 -   Current Mission/Condition Sets for the identified
                System Name.

From this screen, the user can select, insert, modify, copy,
or delete Mission/Condition Set files.

<u>User Actions:</u>
The commands and processes that are available are identical
to those described for screen 0.24.

select   Next screen is 0.56.

insert, modify, copy, delete - See screen 0.24.

<ESC> Returns the user to screen 0.53.

```
        ┌─────────────────────────────────────────────┐
        │            RESUME MDA ANALYSIS              │─┐
        ├─────────────────────────────────────────────┤ │
        │                                             │ │
        │  1.  System name:   UH─┌────────────────────┴─┴──────────────────┐
        │  2.  Mission/Condition │  CURRENT MISSION/CONDITION SETS          │
        │                        │  SETS FOR: UH─60 BLACK HAWK              │
        ├────────────────────────┤                                          │
        │                        │                                          │
        │       type─in          │           1.  USA1                       │
        │                        │           2.  USNORMAL                    │
        └────────────────────────┤           3.  MIDEAST                     │
                                 │                                          │
                                 │                                          │
                                 ├──────────────────────────────────────────┤
                                 │ select  insert  modify  copy  delete     │
                                 └──────────────────────────────────────────┘
```

Screen 0.53 -   Current Mission/Condition Sets for the identified
                    System Name.

Screen 0.59 - MDA Utilities menu.

From this menu, the user can use normal menu selection procedures to choose a utility function.

<u>User Action:</u>
1. Directory - Next screen is 0.60.

2. Delete - Next screen is 0.61.

3. Copy - Next screen is 0.62.

4. Print - Next screen is 0.63.

5. Settings - Next screen is 0.65.

<ESC> Returns the user to screen 0.2.

```
┌─────────────────────────────────────┐
│     MDA System Utilities            │
├─────────────────────────────────────┤
│                                     │
│   1.  Directory Listing             │
│   2.  Delete Files                  │
│   3.  Copy Files                    │
│   4.  Print Files                   │
│   5.  Settings                      │
│                                     │
└─────────────────────────────────────┘
```

Screen 0.5 - MDA Utilities menu.

Screen 0.60 - Directory listing of all system names currently
being evaluated.

This is an informational screen. The only user action is to
page back and forth through the list of saved system files.

<u>User Actions:</u>

<PgDn>   Displays the next page of system names stored on
the current disk (if there is one).

<PgUp>   Displays the previous page of system names stored
on the current disk (if there is one).

<ESC>   Returns the user to screen 0.59.

MDA SYSTEMS DIRECTORY	
System Name:	Date Created:
1. UH-60 Black Hawk	02/03/87
2. UH-1 Iroquois	02/10/87
3. AH-1 Apache	02/11/87
4. AH-1S Cobra	03/10/87
5. M60 Tank	03/26/87

Screen 0.60 -   **Directory listing of all system names currently being evaluated.**

Screen 0.61 - Delete System Files message.

Prompts the user to enter the name of the system whose files
that he or she wants to delete. This utility will delete
all of the files that are associated with the system name
entered.

User Actions:

Using normal editing keys and procedures the user will enter
the name of the system files to be deleted. Next screen is
0.61A.

<ESC> Returns the user to screen 0.59.

```
┌─────────────────────────────────────────────────────────────┐
│                   DELETE SYSTEM FILES                         │
├─────────────────────────────────────────────────────────────┤
│                                                               │
│   Enter System Name to delete:  ___                           │
│                                                               │
│                                                               │
└─────────────────────────────────────────────────────────────┘
```

Screen 0.61 -   Delete System Files message.

Screen 0.61A - Delete Verification message.

Before the files for any system can be deleted, the user
must verify the delete request.

User Actions:

Y   Confirms the delete request. Next screen is 0.59.

N   Cancels the delete request. Next screen is 0.59.

<ESC> Cancels the delete request. Next screen is 0.59.

```
+------------------------------------------------------+
|                 DELETE SYSTEM FILES                  |
+------------------------------------------------------+
|                                                      |
|  Enter System Name to delete: UH-60 Black Hawk       |
|                                                      |
|      +-------------------------------------------+   |
|      |              WARNING !                    |   |
|      +-------------------------------------------+   |
|      |  If you continue this operation, all of   |   |
|      |  files associated with the current System |   |
|      |  name will be permanently deleted from the|   |
|      |  disk.                                    |   |
|      |                                           |   |
|      |      OK to continue ?   Y or N            |   |
|      |                                           |   |
|      +-------------------------------------------+   |
```

Screen 0.01A -   Delete Verification message.

Screen 0.62 - Copy message.

    Prompts the user to enter the name of a system whose files
he or she wants to copy. The copy utility will copy all of
the files that are associated with a system name.

User Actions:
Using normal editing keys and procedures, the user will
enter a system name. Next screen is 0.62A.

<ESC> Returns the user to screen 0.59.

```
┌─────────────────────────────────────────────────┐
│              COPY  SYSTEM  FILES                  │
├─────────────────────────────────────────────────┤
│                                                   │
│   Enter  Source  System  Name:____                │
│                                                   │
│                                                   │
└─────────────────────────────────────────────────┘
```

Screen 0.62 -   Copy message.

Screen 0.62A - Copy message - target system name.

> After the user has enter the name of a system to copy, the
> system will prompt the user to enter a target system name
> for the new files.

> <u>User Actions:</u>
> Using normal editing keys and procedures, the user will
> enter a target system name.

> <ESC> Returns the user screen 0.59.

```
┌─────────────────────────────────────────────────────────────┐
│                  COPY SYSTEM FILES                           │
├─────────────────────────────────────────────────────────────┤
│                                                             │
│   Enter Source System Name: UH-60 Black Hawk                │
│   Enter Target System Name: UH-60 Black Hawk2               │
│                                                             │
└─────────────────────────────────────────────────────────────┘
```

Screen 0.62A -   Copy message - target system name.

Screen 0.63 - Print File menu.

Displays a list of all of the files stored on the current
hard disk. From this list, the user can select a file to
print.

User Actions:

Using normal menu selection procedures, the user will choose
a file to print. Next screen is 0.63A.

<ESC> Returns the user to screen 0.59.

```
┌─────────────────────────────────────────────────────────────────┐
│                     PRINT SYSTEM FILES                            │
├─────────────────────────────────────────────────────────────────┤
│   File Name:            Size:              Date Created:          │
├─────────────────────────────────────────────────────────────────┤
│                                                                   │
│   1.  UH-60.CMP        21344               12/25/87               │
│   2.  UH-60.SCN        16238               12/28/87               │
│   3.  M60.CMP          12899               10/29/87               │
│   4.  M60.SCN           8765               11/01/87               │
│   5.  M60.TSK          10998               11/14/87               │
│   6.  AH-1S.CMP       123688               11/24/87               │
├─────────────────────────────────────────────────────────────────┤
│       select                                                      │
└─────────────────────────────────────────────────────────────────┘
```

Screen 0.63 -   Print File menu.

Screen 0.63A - Print File menu with "PRINTING" message displayed.

<u>User Actions:</u>

None   Next screen is 0.59.

```
+-----------------------------------------------------------------+
|                    PRINT SYSTEM FILES                           |
+-----------------------------------------------------------------+
|   File Name:           Size:              Date Created:         |
+-----------------------------------------------------------------+
|                                                                 |
|   1.  UH-60.CMP    +---------------------+     12/25/87         |
|   2.  UH-60.SCN    |                     |     12/28/87         |
|   3.  M60.CMP      |      PRINTING       |     10/29/87         |
|   4.  M60.SCN      |                     |     11/01/87         |
|   5.  M60.TSK      |                     |     11/14/87         |
|   6.  AH-1S.CMP    +---------------------+     11/24/87         |
|                         123688                                  |
+-----------------------------------------------------------------+
|        select                                                   |
+-----------------------------------------------------------------+
```

Screen 0.63A -   Print File menu with "PRINTING" message displayed.

Screen 0.64 - Settings

User Actions:

The system will ask user to identify the correct MDA
settings for the type of printers they have, any relevant
system configuration information, and to identify forground
and background colors for all of the menus and command bar
structures. The user will be able to revert to the default
settings at any time. When the user has finished modifying
the default settings, he or she is returned to screen 0.59.

<ESC> Returns the user to screen 0.59.

3.5 STEPS IN APPLYING THE MAINTENANCE MANPOWER ANALYSIS AID

In order to use the MMAA to analyze the maintenance requirements for a proposed new system, the user will perform four general activities:

o   Estimate the maintenance parameters for each component in the system.

o   Identify the maintenance scenario for the evaluation.

o   Execute the maintenance requirements simulation model.

o   Analyze the results of the simulation model.

In order to accomplish each of the four general activities listed above, the user will follow the eight specific steps listed below.

1.   Enter the system component names and all available maintenance parameters from the contractor's system design.

2.   Match system components and parameters from the contractor's design to government baseline estimates from comparable fielded systems.

3.   Identify descrepancies between government baseline estimates and the contractor's estimates of component maintenance parameters.

4. Resolve the identified descrepancies to determine the "best estimates" of component maintenance parameters.

5. Identify/develop parameters for each maintenance scenario to be analyzed in terms of maintenance manpower requirements.

6. Execute the computer simulation to calculate the maintenance manhour and headcount requirements for the proposed system.

7. Evaluate the results of the simulation in terms of the maintenance jobs that are required, the tasks that make up each job, the number of maintenance manhours required, the maintenance headcount requirements, system availability, and system reliability. These requirements are compared to the system performance requirements that were identified in the Product 1 SPREA analysis and the manpower constraints that were identified during the Product 2 MCEA analysis.

8. Investigate potential solutions to maintenance deficiencies by modifying parameters and re-running the simulation model.

3.5.1 STEP 1 - Enter the system component names and all available Component Maintenance Parameters (required by the MMAA) from the contractor's system design.

3.5.1.1 Input

External Input: The contractor's system design documentation that is submitted for evaluation the Program

3-141

Manager's office. Not all of the information required for the MMAA analysis will be contained in the contractor's documentation. However, this documentation must, at least, contain a list of all components in the proposed new system. The contractor's documentation should also include a Logistical Support Analysis Record that should indicate the quantitative, qualitative, and procedural requirements for all planned and corrective maintenance activities. The user will obtain, from the system design, as many of the following parameters for each component:

o   the functional system to which the component belongs.

o   the component name

o   each maintenance action required

o   the type of maintenance personnel required to perform the maintenance (e.g. electrican, MOS/Skill level)

o   the type of maintenance (planned or corrective)

o   the mean operational units between failure

o   the operational units metric (miles, time, rounds fire)

o   maintenance mean time to repair

o   the maintenance organization (ds, gs, etc.)

o   an indication of whether or not failure of the component will cause the mission to be aborted.

NOTE: This description of input data from the system design represents a "best case" situation. In reality, the contractor may supply only a portion of the above data.

Internal Input: The MMAA software and Component Maintenance Parameter Templates.

3.5.1.2 Process

The user/analyst will gain access to the MMAA from the MDA Flowchart Menu. The screen that the user will see, upon accessing the MMAA is flowchart menu of the four major activities included in the MMAA. The first four steps in the overall process can be performed iteratively by the user to identify all of the Component Maintenance Parameters in the system under evaluation. For example, the user may want to perform Step 1 for all functional systems in the system design and then move on to Step 2 for all functional systems and continue until all four Steps have been performed for all of the functional systems. However, it will also be possible for the user to perform Steps 1-4 for the first functional system and then move on to the next functional system.
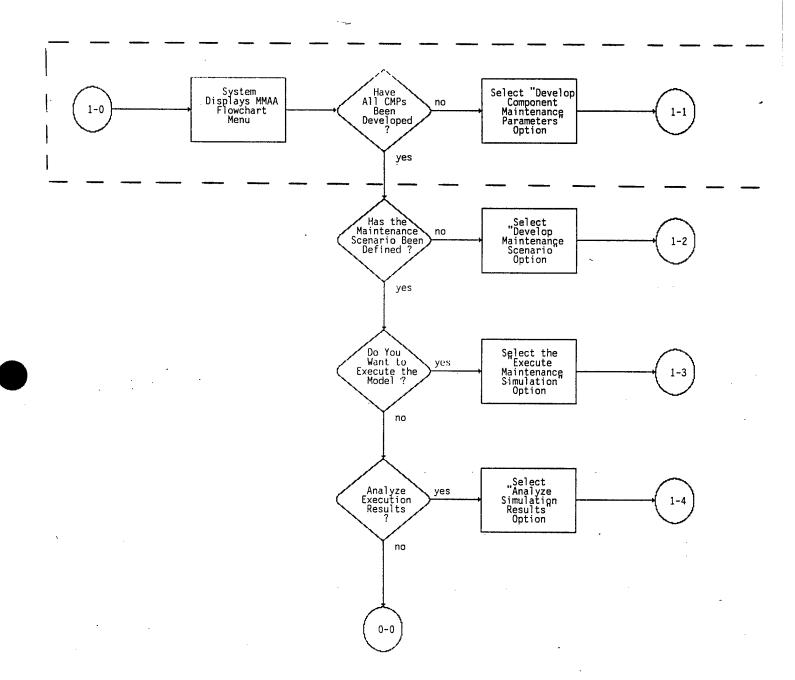
To begin step 1, the analyst will choose the "Develop Component Maintenance Parameters" option from the flowchart menu. After selection this option, the user is presented with a menu that lists all of the functional systems within the major system for which Component Maintenance Parameters have been developed. The first time the user accesses the MMAA, the list will be blank. From this screen, the user can insert a new functional system, modify the components and parameters for an existing functional system, copy, or delete an existing functional system.
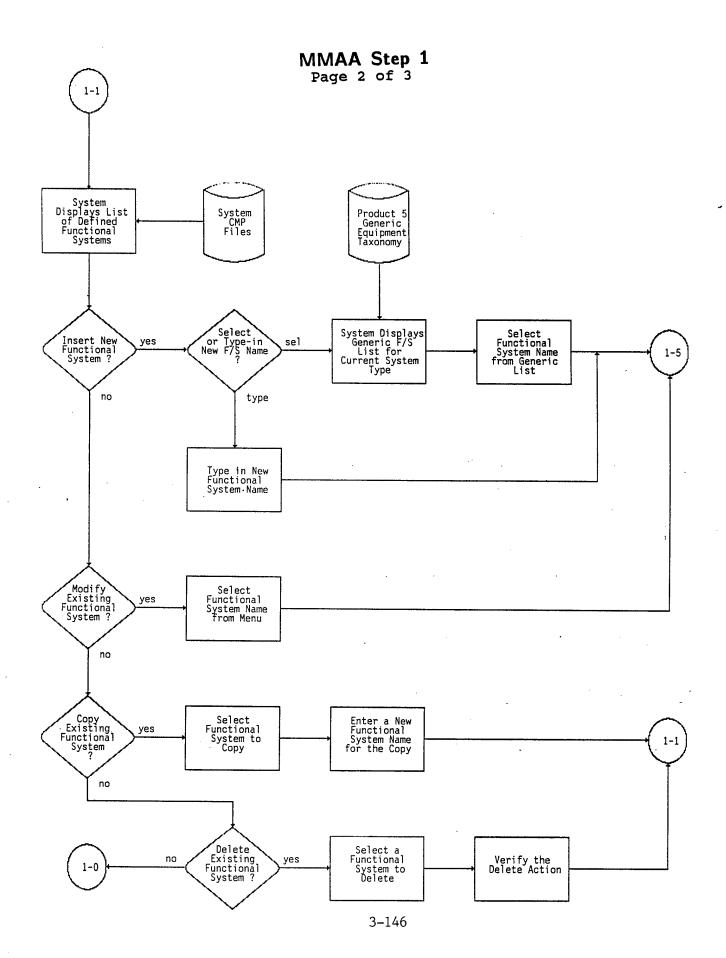
When the user inserts a new functional system or selects to modify an existing functional system, the MMAA will display a Component Maintenance Parameters Template for that functional system. The CMP Template is a spreadsheet-like matrix that has a space for component names in the leftmost column. The top row of the matrix contains column headings that identify the maintenance parameters required
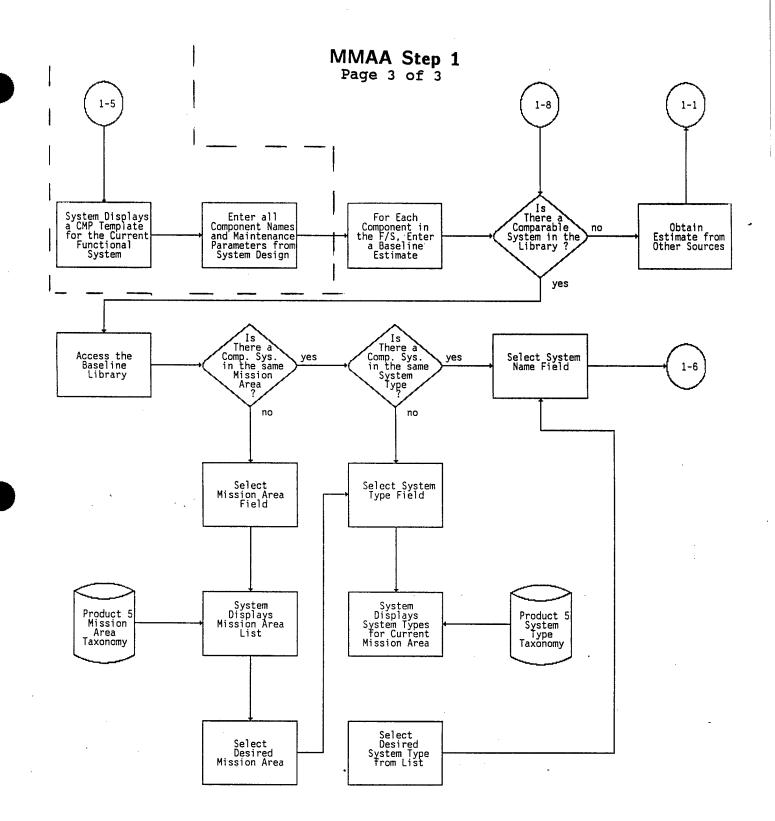
for each component. The cells that are the intersection of a row (component name) and column (maintenance parameter) are divided into an upper and lower portion. In the upper portion, the user will enter maintenance parameter estimates that are available in the system design. The lower portion will be used to enter government baseline estimates in a later step. The analyst will continue to add new functional systems and enter the component names and available Component Maintenance Parameters for each new functional system until all of the components in the system design have been entered.

The flow diagrams of the process of performing step 1 are included on the following pages.

```
        ( 1-1 )

   +---------------+        _____           _____
   |    System     |       /          /|         /          /|
   | Displays List |<------| System   | |        | Product 5| |
   | of Defined    |       | CMP      | |        | Generic  | |
   | Functional    |       | Files    | |        | Equipment| |
   |   Systems     |       |_____|/         | Taxonomy |/
   +---------------+        ‾‾‾‾‾‾‾‾‾‾             ‾‾‾‾‾‾‾‾‾‾
          |                                            |
          |                                            v
        /   \                  /   \             +---------------+      +---------------+
       /     \               /       \           |System Displays|      |    Select     |
      / Insert \    yes     / Select   \   sel   | Generic F/S   |      |  Functional   |
     /   New    \--------->/ or Type-in \------->|  List for     |----->| System Name   |----->( 1-5 )
     \ Functional/         \ New F/S Name/        | Current System|      | from Generic  |
      \ System ?/           \     ?     /         |     Type      |      |    List       |
       \     /               \       /            +---------------+      +---------------+
        \   /                  \   /
          | no                   | type
          |                      v
          |              +---------------+
          |              |  Type in New  |
          |              |  Functional   |
          |              | System Name   |
          |              +---------------+
          |                      |
          v
        /   \                  +---------------+
       /     \               |    Select     |
      / Modify \    yes      |  Functional   |
     / Existing \----------->| System Name   |
     \ Functional/           |  from Menu    |
      \ System ?/            +---------------+
       \     /
        \   /
          | no
          v
        /   \                  +---------------+      +---------------+
       / Copy \              |    Select     |      |  Enter a New  |
      /Existing\   yes       |  Functional   |      |  Functional   |
     /Functional\----------->| System to     |----->| System Name   |----->( 1-1 )
     \ System  /             |    Copy       |      | for the Copy  |
      \   ?   /              +---------------+      +---------------+
       \     /
        \   /
          | no
          v
                  /   \                  +---------------+      +---------------+
     ( 1-0 )<--- / Delete\   yes        |   Select a    |      |  Verify the   |
           no   /Existing \------------>|  Functional   |----->| Delete Action |
              /Functional  \            | System to     |      |               |
              \ System ?   /            |   Delete      |      |               |
               \         /              +---------------+      +---------------+
                \       /
                 \     /
                  \   /
```

(1-5)

(1-8)

(1-1)

System Displays a CMP Template for the Current Functional System

Enter all Component Names and Maintenance Parameters from System Design

For Each Component in the F/S, Enter a Baseline Estimate

Is There a Comparable System in the Library ?

no

Obtain Estimate from Other Sources

yes

Access the Baseline Library

Is There a Comp. Sys. in the same Mission Area ?

yes

Is There a Comp. Sys. in the same System Type ?

yes

Select System Name Field

(1-6)

no

no

Select Mission Area Field

Select System Type Field

Product 5 Mission Area Taxonomy

System Displays Mission Area List

System Displays System Types for Current Mission Area

Product 5 System Type Taxonomy

Select Desired Mission Area

Select Desired System Type from List

3.5.1.3 Output

The output of this step will be a set of Component
Maintenance Parameter Templates that are stored as records
in the Component Maintenance Parameters data file for the
current system. There will be one Template (record) for
each functional system in the system design. Each Template
will contain a list of the component names and the Component
Maintenance Parameters for each component that are available
in the system design.

3.5.1.4 User Interface

The user interfaces that apply to this step are
described in detail on the following pages. Please note
that all screens for the MMAA are labeled "Screen 1.X".
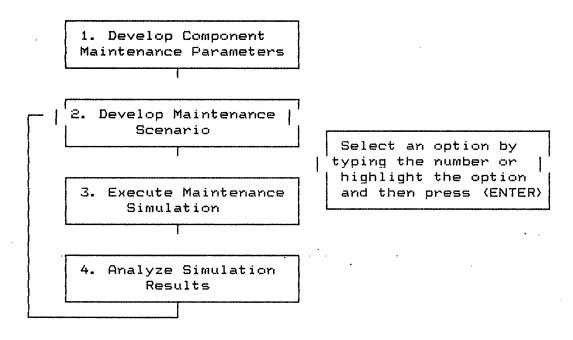
Screen 1.1 -   Flowchart Menu for the MMAA.

This screen is a menu of the activities that the user
will perform in conducting a maintenance manpower
requirements analysis for a new system design. The
arrows on the flowchart menu indicate the order in
which the activities will be performed. The use can
use the arrow keys and normal selection procedures to
make a selection.

User Actions:

1.   Develop Component Maintenance Parameters. Next
      screen is 1.5.

2.   Develop Maintenance Scenario. When this option is
      selected, the system will read the functional
      system and component names from the Component
      Maintenance Parameter file. Therefore, this
      option should not be selected until all of the
      Component Maintenance Parameters have been entered
      (option 1). Next screen is 1.68. If no Component
      Maintenance Parameters have been developed, an
      warning message will display indicating that the
      CMPs should be entered first.

3.   Execute Maintenance Simulation. Next screen is
      1.81. If no Component Maintenance Parameters have
      been developed or if no Maintenance Scenario file
      has been developed, an error message displays.

4.   Analyze Simulation Results. The simulation model
      must have been executed prior to selecting this
      option. Next screen is 1.89. If the simulation
      has not been executed for this system. An error
      message indicating such will display.

FLOWCHART FOR THE MAINTENANCE MANPOWER ANALYSIS AID

```
┌─────────────────────────┐
│  1. Develop Component    │
│  Maintenance Parameters  │
└─────────────────────────┘
             │
┌─────────────────────────┐
│  2. Develop Maintenance  │
│         Scenario         │
└─────────────────────────┘
             │
┌─────────────────────────┐
│  3. Execute Maintenance  │
│       Simulation         │
└─────────────────────────┘
             │
┌─────────────────────────┐
│  4. Analyze Simulation   │
│         Results          │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│  Select an option by     │
│  typing the number or    │
│  highlight the option    │
│  and then press (ENTER)  │
└─────────────────────────┘
```

Screen 1.1 -   Flowchart Menu for the MMAA.

Screen 1.5 -   List of Functional Systems.

This screen list all of the currently created (saved)
functional system templates. The first time the user
accesses this screen the list will be blank. From this
screen, the user can use normal (generic) menu/command
selection strategies to insert, modify, copy, or delete
a functional system template.

User Actions:

insert   When the insert command is highlighted, the
           user can use normal strategies to choose the
           functional system name after which a new
           functional system will be inserted. Next
           screen is 1.10.

modify   When the modify command is highlighted, the
           user can use normal stragegies to choose a
           functional system for which to add or modify
           components and/or maintenance parameters.
           When a name system is selected the Component
           Maintenance Parameter Template for that
           functional system will display. Next screen
           is 1.31.

copy   When the copy command is highlighted, the
           user can make and exact copy of a the
           selected funcional system template under a
           new name. The name of the new system is
           displayed directly below the copied system in
           the list. Next screen is 1.22.

delete   When the delete command is highlighted, the
           user can use normal strategies to choose a

functional system template to delete from the disk. Next screen is 1.29.

<ESC>   Returns the user to screen 1.1.

<u>Input File:</u>
Component Maintenance Parameter file for the identified system.

```
┌─────────────────────────────────────────┐
│        LIST OF FUNCTIONAL SYSTEMS        │
├─────────────────────────────────────────┤
│                                          │
│   1. Hydraulics System                   │
│   2. Electrical System                   │
│   3. Communications System               │
│                                          │
│                                          │
│                                          │
│                                          │
├─────────────────────────────────────────┤
│   insert    modify    copy    delete     │
└─────────────────────────────────────────┘
```

Screen 1.5 -   List of Functional Systems.

Screen 1.10 - List of Functional Systems with a blank field
            displayed at the insert position and the
            "type-in" and "select" commands displayed.

From this screen, the user can choose to type-in a new
functional system name or to select a new functional
system name from a generic list of functional systems
for the identified System Type.

<u>User Actions:</u>

type-in   When this is the selected command, a flashing
           cursor will be displayed at the insertion
           point. Next screen is 1.11.

select   When this is the selected command, a list of
           generic functional systems for the current
           System Type displays. Next screen is 1.12.

<ESC>   Returns the user to screen 1.5.

```
┌─────────────────────────────────────────────┐
│         LIST OF FUNCTIONAL SYSTEMS           │
├─────────────────────────────────────────────┤
│                                              │
│   1. Hydraulics System                       │
│   2. Electrical System                       │
│   3. Communications System                   │
│   4.                                         │
│                                              │
│                                              │
│                                              │
│                                              │
├─────────────────────────────────────────────┤
│       type-in            select              │
└─────────────────────────────────────────────┘
```

Screen 1.10 -   **List of Functional Systems with a blank field displayed at the insert position and the "type-in" and "select" commands displayed.**

Screen 1.11 - List of Functional Systems with a flashing
cursor displayed at the insertion point.

From this screen, the user can type-in the name of a
new functional system.

<u>User Actions:</u>
The user will use normal editing keys and procedures to
enter the name of a functional system of components for
the system under evaluation such as the avionics system
or the electrical system. The string of characters
that constitute the name will be terminated by pressing
the <ENTER> key. When the new system name has been
entered, the system will display a blank Component
Maintenance Parameter Template for the inserted
functional system name. Next screen is 30A??

<ESC> Returns the user to screen 1.10.

```
+-----------------------------------------------+
|        LIST OF FUNCTIONAL SYSTEMS             |
|-----------------------------------------------|
|                                               |
|  1.  Hydraulics System                        |
|  2.  Electrical System                        |
|  3.  Communications System                    |
|  4.  ___                                       |
|                                               |
|                                               |
|                                               |
|-----------------------------------------------|
|        type-in          select                |
+-----------------------------------------------+
```

Screen 1.11 -   List of Functional Systems with a flashing cursor

Screen 1.12 - Generic Functional Systems List for the
                identified System Type.

        From this screen, the user can select a name for the
        functional system template to be inserted.

        User Actions:
        Using normal menu selection procedures, the user can
        choose a functional system name. Next screen is 1.30A.
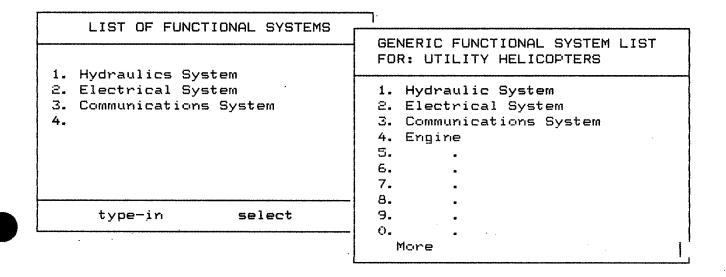
        <ESC> Returns the user to screen 1.10.

        Input File:
        Product 5 Generic Equipment by System Type file.

```
┌─────────────────────────────────────┐
│     LIST OF FUNCTIONAL SYSTEMS       │
│─────────────────────────────┌────────────────────────────────┐
│                             │ GENERIC FUNCTIONAL SYSTEM LIST │
│ 1. Hydraulics System        │ FOR: UTILITY HELICOPTERS       │
│ 2. Electrical System        │────────────────────────────────│
│ 3. Communications System    │ 1.  Hydraulic System           │
│ 4.                          │ 2.  Electrical System          │
│                             │ 3.  Communications System      │
│                             │ 4.  Engine                     │
│                             │ 5.        .                    │
│                             │ 6.        .                    │
│                             │ 7.        .                    │
│─────────────────────────────│ 8.        .                    │
│    type-in       select     │ 9.        .                    │
│                             │ 0.        .                    │
└─────────────────────────────│      More                      │
                              └────────────────────────────────┘
```

Screen 1.12 -   Generic Functional Systems List for the identified
                 System Type.

Screen 1.22 - List of Functional Systems with a flashing
               cursor displayed in the field directly below
               the Functional System Template to be copied.

From this screen, the user can enter the name of a new
functional system.

<u>User Actions:</u>
Using normal editing keys and procedures, the user can
enter a new functional system name for the copy. Next
screen is 1.23.

<ESC> Returns the user to screen 1.5.

```
┌─────────────────────────────────────────────┐
│        LIST OF FUNCTIONAL SYSTEMS           │
├─────────────────────────────────────────────┤
│                                             │
│   1. Hydraulics System                      │
│   2. Electrical System                      │
│   3. Communications System                  │
│   4. Engine                                 │
│   5. ▬                                       │
│                                             │
│                                             │
├─────────────────────────────────────────────┤
│   insert    modify    copy    delete        │
└─────────────────────────────────────────────┘
```

Screen 1.22 -   **List of Functional Systems with a flashing cursor
displayed in the field directly below the
Functional System Template to be copied.**

Screen 1.23 - List of Functional Systems with a delete
               verification message displayed.

     From this screen, the user must either verify or cancel
     the delete command.
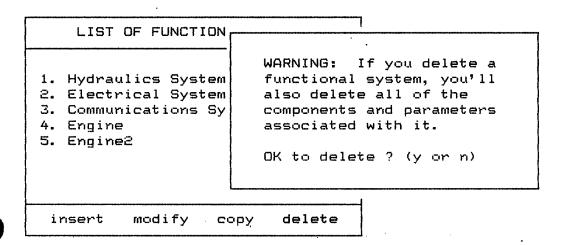
     <u>User Actions:</u>
     Y   Confirms the delete operation. Next screen is
          1.5.

     N   Cancels the delete request. Next screen is 1.5.

     <ESC> Cancels the delete request. Next screen is 1.5.

```
 _____
|   LIST OF FUNCTION _____
|                   |                          |
|_____|   WARNING:  If you delete a |
|                   |   functional system, you'll |
| 1. Hydraulics System   also delete all of the   |
| 2. Electrical System   components and parameters |
| 3. Communications Sy   associated with it.       |
| 4. Engine         |                          |
| 5. Engine2        |   OK to delete ? (y or n) |
|                   |_____|
|_____
|   insert    modify   copy    delete |
|_____|
```

Screen 1.23 -   List of Functional Systems with a delete
                 verification message displayed.

3-163

Screen 1.30A - Blank Component Maintenance Parameter
                Template for the inserted functional system.

From this screen, the user can use normal template
editing keys and procedures to enter the name of each
component in the functional system from the
contractor's design and enter all of the available
Component Maintenance Parameters that are included in
the design documentation.

<u>User Actions:</u>
Using normal editing procedures, the user will enter
all of the components and available maintenance
parameters that were obtained from the contractors
design documents. See section 3.1.

When the user has finished entering the component names
and parameters from the system design, he or she can
press the <ESC> key to return screen 1.5 and choose a
new functional system to work on or move on to Step 2.

more

System name: UH-60 Black Hawk		Functional System: Engine				
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric	

Screen 1.30A -   **Blank Component Maintenance Parameter Template for the inserted functional system.**

Screen 1.31 - Component Maintenance Parameter Template with
                some information entered.

        From this screen, the user can enter or modify
        information from the system design, press the <ESC> key
        to return to screen 1.5 and choose a new functional
        system to work on or move on to step 2.

| System name: UH-60 Black Hawk | | Functional System: Engine | | | | |

Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric	
Fuel Injection	adjust	63D10	C	107.5	miles	
Cylinder Head	repair	63D20	C	1020	miles	
Crankshaft	repair	63D20	C	980	miles	
Seals, main	replace·					

Screen 1.31 ·   Component Maintenance Parameter Template with some
information entered.

3.5.2 STEP 2 - Match system components and parameters from the contractor's design to baseline estimates from comparable systems.

3.5.2.1 Input

External: The input required for Step 2 is a list of components and estimates of the maintenance parameters that are required by the MMAA (see Step 1) for each component from comparable fielded systems. Ideally, this information will reside in the Baseline Library. However, when a comparable system does not reside in the Library the analyst will need to obtain this information from the following external sources:

o   Army Annual Maintenance Manhours Data Base (AMMDB)
o   Sample Data Collection Data Base
o   Army equipment inventories of fielded systems
o   System design specifications for fielded systems
o   Technical manuals for maintenance activities
o   Subject Matter Experts

Internal: The input for this step that is included within the MMAA will be 1) Component Maintenance Parameter files containing the names of each hardware/software component by functional system created in Step 1. 2) The Baseline Library of Component Maintenance Parameters for fielded systems. 3) MMAA software.

3.5.2.2 Process
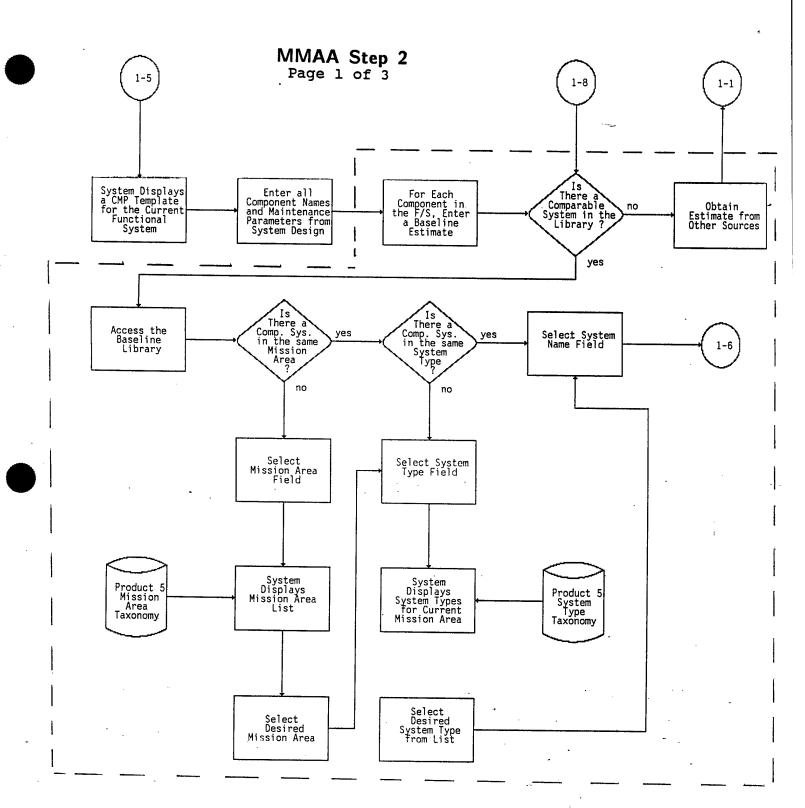
The process of identifying baseline estimates of system Component Maintenance Parameters to be entered into the Component Maintenance Parameter Template as government estimates is dependent on the availability of fielded system
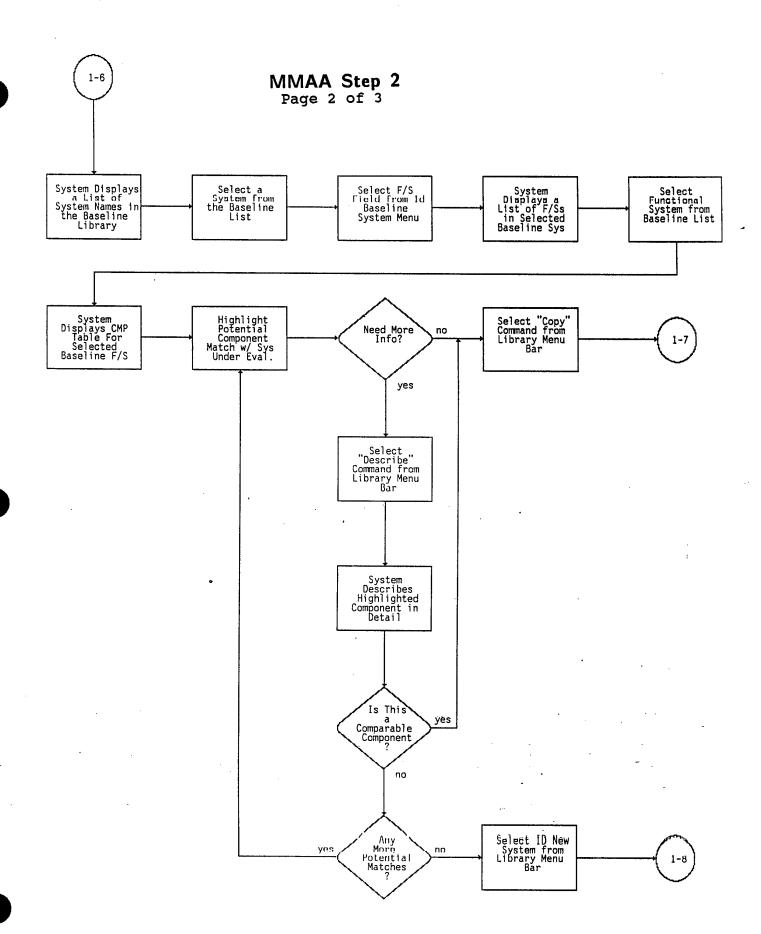
data in the Baseline Library. The user/analyst can enter government estimates directly into the lower portion of each cell of the Component Maintenance Parameter Template using normal editing procedures or copy Component Maintenance Parameters from comparable fielded systems that reside in the Baseline Library.
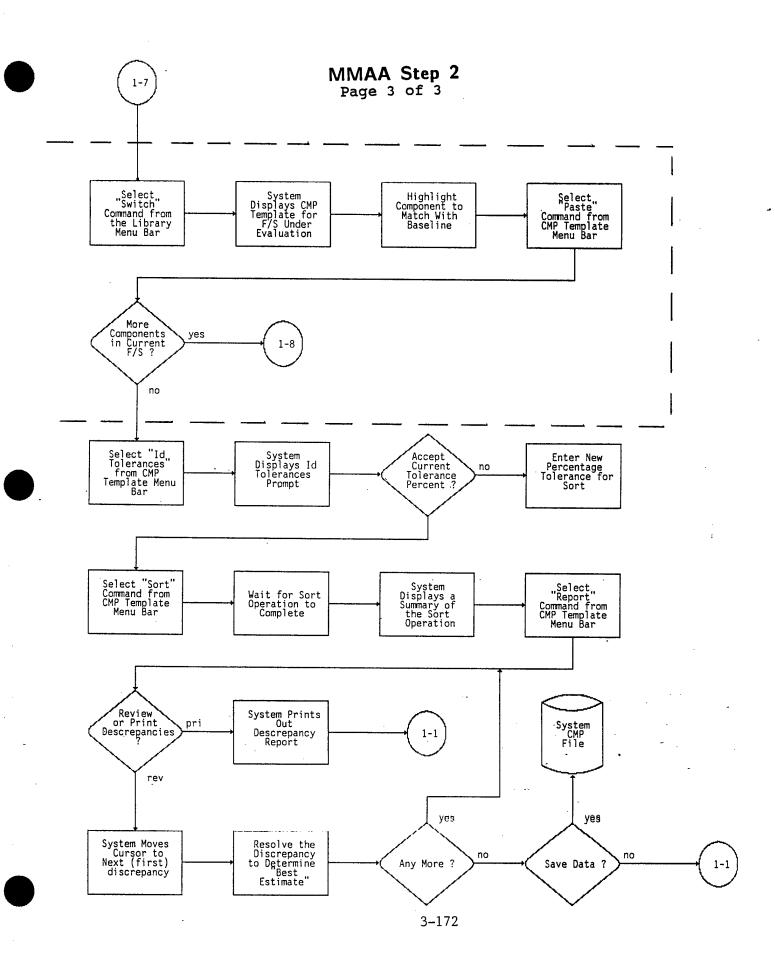
When the analyst first gains access to the Baseline Library, he or she will need to identify a comparable baseline system down to the functional system level. When the user chooses to view the components and maintenance paremeters for an identified baseline system, a Baseline Library Template, similar to the Component Maintenance Paremeter Template will display. From this template, the user can copy a component and all of its associated maintenance parameters or a block of components and maintenance parameters into a buffer. Then, the user can return to the Component Maintenance Parameter Template in which he or she was working and copy the contents of the buffer into the government estimates portion of the cell or cells for components in the new system. This process is repeated until all of the available baseline estimates have been copied from the Library for all functional systems in the system under evaluation.

In cases where data from a suitable system does not exist in the Baseline Library, the analyst will need to identify the Component Maintenance Parameters from comparable systems from other sources and enter them directly into the Component Maintenance Parameter Template using the process outlined in Step 1.

The flow diagrams of the process of performing Step 2 are included on the following pages.

(1-5)

(1-8)

(1-1)

```
┌──────────────┐     ┌──────────────┐     ┌──────────────┐         ◇ Is          ┌──────────────┐
│System Displays│     │  Enter all   │     │  For Each    │      There a         │   Obtain     │
│a CMP Template │ →   │Component Names│ →  │ Component in │ →  Comparable  → no │Estimate from │
│for the Current│     │and Maintenance│     │ the F/S, Enter│    System in the    │Other Sources │
│  Functional  │     │Parameters from│     │  a Baseline  │      Library ?      │              │
│    System    │     │ System Design │     │   Estimate   │                      └──────────────┘
└──────────────┘     └──────────────┘     └──────────────┘         yes
```

```
┌──────────────┐       ◇ Is              ◇ Is              ┌──────────────┐
│  Access the  │    There a           There a           │Select System │
│   Baseline   │ →  Comp. Sys.  → yes  Comp. Sys.  → yes │ Name Field   │ →  ( 1-6 )
│   Library    │    in the same        in the same        │              │
└──────────────┘    Mission              System            └──────────────┘
                    Area                 Type
                    ?                    ?
                    no                   no
```

```
                    ┌──────────────┐     ┌──────────────┐
                    │   Select     │     │Select System │
                    │ Mission Area │     │  Type Field  │
                    │    Field     │     │              │
                    └──────────────┘     └──────────────┘
```

```
 ╭─────────╮       ┌──────────────┐     ┌──────────────┐      ╭─────────╮
 │Product 5│       │   System     │     │   System     │      │Product 5│
 │ Mission │   →   │  Displays    │     │  Displays    │  ←   │ System  │
 │  Area   │       │ Mission Area │     │ System Types │      │  Type   │
 │Taxonomy │       │    List      │     │ for Current  │      │Taxonomy │
 ╰─────────╯       └──────────────┘     │ Mission Area │      ╰─────────╯
                                        └──────────────┘
```

```
                    ┌──────────────┐     ┌──────────────┐
                    │   Select     │     │   Select     │
                    │   Desired    │     │   Desired    │
                    │ Mission Area │     │ System Type  │
                    │              │     │  from List   │
                    └──────────────┘     └──────────────┘
```

(1-6)

```
┌─────────────────┐   ┌─────────────────┐   ┌─────────────────┐   ┌─────────────────┐   ┌─────────────────┐
│ System Displays │   │    Select a     │   │  Select F/S     │   │     System      │   │     Select      │
│   a List of     │──▶│  System from    │──▶│  Field from Id  │──▶│   Displays a    │──▶│   Functional    │
│ System Names in │   │  the Baseline   │   │    Baseline     │   │  List of F/Ss   │   │  System from    │
│  the Baseline   │   │     List        │   │  System Menu    │   │  in Selected    │   │ Baseline List   │
│    Library      │   │                 │   │                 │   │  Baseline Sys   │   │                 │
└─────────────────┘   └─────────────────┘   └─────────────────┘   └─────────────────┘   └─────────────────┘
```

```
┌─────────────────┐   ┌─────────────────┐       ◇                   ┌─────────────────┐
│     System      │   │    Highlight    │   ◇       ◇               │ Select "Copy"   │
│ Displays CMP    │──▶│    Potential    │──▶ ◇ Need More ◇   no     │ Command from    │──▶ ( 1-7 )
│  Table For      │   │   Component     │    ◇   Info?   ◇ ───────▶ │ Library Menu    │
│   Selected      │   │  Match w/ Sys   │     ◇       ◇              │     Bar         │
│ Baseline F/S    │   │  Under Eval.    │         ◇                  └─────────────────┘
└─────────────────┘   └─────────────────┘
```

yes

```
                    ┌─────────────────┐
                    │    Select       │
                    │  "Describe"     │
                    │ Command from    │
                    │ Library Menu    │
                    │     Bar         │
                    └─────────────────┘

                    ┌─────────────────┐
                    │    System       │
                    │   Describes     │
                    │  Highlighted    │
                    │  Component in   │
                    │    Detail       │
                    └─────────────────┘
```

```
                         ◇
                     ◇       ◇
                    ◇  Is This  ◇
                    ◇     a      ◇    yes
                    ◇ Comparable ◇ ───────▶
                    ◇ Component  ◇
                     ◇    ?    ◇
                         ◇
```

no

```
                         ◇                        ┌─────────────────┐
                     ◇       ◇                    │ Select ID New   │
          yes       ◇   Any     ◇    no           │  System from    │
       ◀──────────  ◇   More     ◇ ──────────────▶│ Library Menu    │──▶ ( 1-8 )
                    ◇ Potential  ◇                │     Bar         │
                     ◇ Matches  ◇                 └─────────────────┘
                         ◇  ?
```

(1-7)

Select "Switch" Command from the Library Menu Bar → System Displays CMP Template for F/S Under Evaluation → Highlight Component to Match With Baseline → Select "Paste" Command from CMP Template Menu Bar

More Components in Current F/S ? — yes → (1-8)

no

Select "Id Tolerances" from CMP Template Menu Bar → System Displays Id Tolerances Prompt → Accept Current Tolerance Percent ? — no → Enter New Percentage Tolerance for Sort

Select "Sort" Command from CMP Template Menu Bar → Wait for Sort Operation to Complete → System Displays a Summary of the Sort Operation → Select "Report" Command from CMP Template Menu Bar

Review or Print Descrepancies ? — pri → System Prints Out Descrepancy Report → (1-1)

rev

System Moves Cursor to Next (first) discrepancy → Resolve the Discrepancy to Determine "Best Estimate" → Any More ? — yes / no → Save Data ? — yes / no → (1-1)

System CMP File

3.5.2.3 Output

The output of this step will be a set of Component Maintenance Parameter Templates that are stored as records in the Component Maintenance Parameters data file for the current system. Each record will contain a list of the component names, the Component Maintenance Parameters for each component that were available from the system design and a government estimate of Component Maintenance Parameters from comparable fielded systems.

3.5.2.4 User Interface

The user interfaces that apply to this step are described in detail on the following pages. Please note that all screens for the MMAA are labeled "Screen 1.X".

Screen 1.31 - Component Maintenance Parameter Template.

Whenever the user has entered one or more components to the Component Maintenance Parameter Template, he or she can gain access to the Baseline Library to search for a comparable system component.

<u>User Actions:</u>

F9   Displays the menu bar of commands that are available from the Component Maintenance Parameter Template. Next screen is 1.36.

<ESC> Returns the user to screen 1.5.

System name: UH-60 Black Hawk		Functional System: Engine				
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric	
Fuel Injection	adjust	63D10	C	107.5	miles	
Cylinder Head	repair	63D20	C	1020	miles	
Crankshaft	repair	63D20	C	980	miles	
Seals, main	replace					

Screen 1.31   Component Maintenance Parameter Template.

Screen 1.36 -   Component Maintenance Parameter Template with
                menu bar displayed.

From this screen, the user can gain access to the
Baseline Library, paste one or more components and
maintenance parameters copied into the buffer from the
Baseline Library, identify tolerances for a sort
operation (Step 3), sort the Component Maintenance
Parameter Template for discrepancies (Step 3), or
report discrepancies found during the most recent sort
operation (Step 3).

<u>User Actions:</u>
Access Library - When this command is selected the
system will switch the user to the Identify Baseline
System menu in the Baseline Library. Next screen 1.37.

Paste - When this command is selected, the system will
paste the contents of the copy buffer into the
government estimates portion of the Component
Maintenance Parameter Template at the current cell
cursor location. Next screen is 1.48.

Id Tolerances - When this command is selected the user
will be able to change the tolerance value for the next
sort operation (Step 3). Next screen is 1.52.

Sort - When this command is selected, the system will
begin a sort operation (Step 3). Next screen is 1.55.

Report - When this command is selected, the user will
be able to get a report of the results of the most
recent sort operation (Step 3). Next screen is 1.58.

<ESC> Returns the user to screen 1.31.

Access Library   Paste   Id Tolerances   Sort   Report
Gain access to Baseline Library to select comparable system components

System name: UH-60 Black Hawk		Functional System: Engine			
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric
Fuel Injection	adjust	63D10	C	107.5	miles
Cylinder Head	repair	63D20	C	1020	miles
Crankshaft	repair				miles
Seals, main	replace				

Screen 1.36 -   Component Maintenance Parameter Template with menu bar displayed.

Screen 1.37 - Identify Baseline System menu.

This menu displays the Mission Area, System Type and Functional System name from the current Component Maintenance Parameters Template as default values. The user can change any of these fields or select the System Name field to identify a comparable system.

User Actions:

1. Mission Area - Next screen is 1.39.

2. System Type - A menu of System Types for the identified Mission Area displays. Next screen is 39A??.

3. System Name - A list of System Names that reside in the Baseline Library for the identified System Type displays. Next screen is 1.40. If a System Type has not been identified, an error message displays.

4. Functional System - A list of functional systems for the identified System Name displays. Next screen is 1.42. If a System Name has not been identified, an error message displays.

5. View System Components - A matrix of components and Component Maintenance Parameters from the Baseline Library displays. Next screen is 1.43. If a functional system has not been identified, an error message displays.

```
┌─────────────────────────────────────────────────┐
│              IDENTIFY BASELINE SYSTEM             │
├─────────────────────────────────────────────────┤
│                                                   │
│   1.   Mission Area:   Aviation                   │
│   2.   System Type:   Utility Helicopters         │
│   3.   System Name:                               │
│   4.   Functional System: Engine                  │
│   5.   View System Components                     │
│                                                   │
└─────────────────────────────────────────────────┘
```

Screen 1.37   Identify Baseline System menu.

Screen 1.39 - Mission Area List.

From this menu, the user can select a Mission Area to begin the search for a baseline system.

User Actions:
Using normal menu selection procedures the user will select a Mission Area from the list. Next screen is 1.37.

<ESC> Returns the user to screen 1.37.

Input File:
Product 5 Missions by System Type Taxonomy file.

```
┌─────────────────────────────────────────────┐
│            IDENTIFY BASELINE SYSTEM          │
│─────────────────────────────────────────────│
│                                              │
│   1.   Mission Area:   Aviation              │
│   2.   System Type:    Utility H┌────────────────────────────────────────┐
│   3.   System Name:             │        MISSION AREA LIST               │
│   4.   Functional System: Engi  │────────────────────────────────────────│
│   5.   View System Components   │   1.   Air Defense                     │
│                                 │   2.   Aviation                        │
└─────────────────────────────────│   3.   Combat Service Support          │
                                  │   4.   Close Combat Light              │
                                  │   5.   Close Combat Heavy              │
                                  │   6.   Fire Support                    │
                                  │   7.   Cancel                          │
                                  │   :                                    │
                                  └────────────────────────────────────────┘
```

Screen 1.39 -   Mission Area List.

3-181

Screen 1.39A - List of System Types for the identified
               Mission Area.

From this screen, the user can select a System Type for
the Baseline Library search for a comparable system.

User Actions:
Using normal menu selection procedures, the user can
choose a System Type. Next screen is 1.37.

<ESC> Returns the user to screen 1.37 with no change to
the System Type field.

Input File:
Product 5 Missions by System Type Taxonomy file.

```
    ┌─────────────────────────────────────────────────┐
    │            IDENTIFY BASELINE SYSTEM  .           │
    │─────────────────────────────────────────────────│
    │                                                  │
    │   1.   Mission Area:   Aviation                  │
    │   2.   System Type:   Utility Helicopters        │
    │   3.   System Name:                        ┌─────────────────────────────────┐
    │   4.   Functional System: Engine           │     AVIATION SYSTEM TYPES        │
    │   5.   View System Components              │─────────────────────────────────│
    │                                            │                                 │
    └────────────────────────────────────────── │   1.  Attack Helicopters        │
                                                 │   2.  Cargo Helicopters         │
                                                 │   3.  Utility Helicopters       │
                                                 │   4.  Scout Helicopters         │
                                                 │   5.  Other Helicopters         │
                                                 │   6.  Fixed Wing                │
                                                 │                                 │
                                                 └─────────────────────────────────┘
```

Screen 1.39A -   **List of System Types for the identified Mission Area.**

3-183

Screen 1.40 - List System Names that reside in the Baseline
              Library for the identified System Type.

From this screen, the user can select a System Type to
search for comparable components.

User Actions:

Using normal menu selection procedures the user can
select a System Name. Next screen is 1.41.

Input File:

Product 5 MMAA Baseline Library.

```
+-------------------------------------------------+
|            IDENTIFY BASELINE SYSTEM             |
|-------------------------------------------------|
|                                                 |
|  1.   Mission Area:   Aviation                  |
|  2.   System Type:   Utility Helicopters        |
|  3.   System Name:                              |
|  4.   Functional System: Eng+-------------------------------------------+
|  5.   View System Components|   BASELINE UTILITY HELICOPTERS           |
|                             |------------------------------------------|
+-----------------------------|                                          |
                              |   1.   UH-1 Iroquois                     |
                              |   2.   UH-60 Black Hawk                  |
                              |   3.   UH-2C                             |
                              |                                          |
                              +------------------------------------------+
```

Screen 1.40 -   **List System Names that reside in the Baseline Library for the identified System Type.**

Screen 1.41 - Identify Baseline System menu with Mission
               Area, System Type, System Name, and
               Functional System identified.

From this screen, the user can choose to view
components and maintenance parameters for the
identified functional system from the Baseline Library
or identify a new comparable system to the functional
system level.

User Actions:
1. Mission Area. Next screen is 1.39.

2. System Type - Next screen is 1.39A??.

3. System Name - Next screen is 1.40.

4. Functional System - 1.42.

5. View System Components - The system displays a
matrix of components and maintenance parameters for the
identified functional system. Next screen is .143.

<ESC> Returns the user to the Component Maintenance
Paremeter Template for the current functional system.
Next screen is 1.36.

```
┌─────────────────────────────────────────────────┐
│          IDENTIFY BASELINE SYSTEM               │
├─────────────────────────────────────────────────┤
│                                                 │
│   1.   Mission Area:   Aviation                 │
│   2.   System Type:    Utility Helicopters      │
│   3.   System Name:    UH-60 Black Hawk         │
│   4.   Functional System: Engine                │
│   5.   View System Components                   │
│                                                 │
└─────────────────────────────────────────────────┘
```

Screen 1.41 -   Identify Baseline System menu with Mission Area,
                      System Type, System Name, and Functional System
                      identified.

Screen 1.42. - Functional System list for the identified
                System Name.

        From this screen, the user can select a functional
        system to search for components and maintenance
        parameters that are comparable to those in the system
        under evaluation.

        User Actions:
        Using normal menu selection procedures, the user can
        select a functional system. Next screen is 1.41.

        <ESC> Returns the user to screen 1.41.

        Input File:
        Product 5 MMAA Baseline Library.

```
      ┌──────────────────────────────────────────────┐
      │          IDENTIFY BASELINE SYSTEM            │
      │                                         ─────┤
      │                                    ┌─────────┴──────────────────────┐
      │  1.   Mission Area:   Aviation     │ FUNCTIONAL SYSTEM LIST FOR:    │
      │  2.   System Type:    Utility Helic│ UH-60 BLACK HAWK               │
      │  3.   System Name:    UH-60 Black H├────────────────────────────────┤
      │  4.   Functional System: Engine    │   1.  Hydraulic                │
      │  5.   View System Components        │   2.  Electrical               │
      │                                    │   3.  Communications           │
      └────────────────────────────────────┤   4.  Fire Control             │
                                           │   5.  Engine                   │
                                           │   6.        .                  │
                                           │   7.        .                  │
                                           │   8.        .                  │
                                           │   9.        .                  │
                                           │   0.        .                  │
                                           │      More                    │ │
                                           └────────────────────────────────┘
```

Screen 1.42. -   Functional System list for the identified System
                  Name.

3-189

Screen 1.43 - Matrix of components names and maintenance
             parameters for the selected functional
             system.

From this screen the user can use normal cursor
movement functionality to view each of the components
and its associated maintenance parameters in the
matrix. When the user is ready to copy one or more
components into the buffer, he or she will highlight
that component. The cell cursor in the Baseline
Library will always highlight a component and all of
its maintenance parameters since the copy operation
will always copy all of the maintenance parameters for
a component. To highlight a block of components, the
user will move the cell highlight cursor to the first
component in the block and then press the <ENTER> key.
This will "anchor" the highlighting. Then the user can
use the up or down arrow keys to highlight additional
components and their maintenance parameters.

User Actions:
Using the cell highlighting procedures outlined above,
the user will highlight cells.

F9 - Will display a menu bar of commands that are
available from this matrix. Next screen is 1.44.

<ESC> When a block of components is highlighted, this
key will de-highlight all but the first component in
the block. When only one component is highlighted,
pressing this key will return the user to screen 1.41.

Input File:
Product 5 MMAA Baseline Library.

System name: UH-60 Black Hawk		Functional System: Engine			
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric
Fuel Injection	adjust	63D10	C	107.5	miles
Cylinder Head	replace	63D10	C	1500	miles
Crankshaft	repair	63D20	C	1120	miles
Seals, main	replace	63D10	C	1000	miles
Master cylinder	repair	63D20	C	2500	miles
Battery Pack	replace	43D20	C	.750	time
Rod, connecting	inspect	63D20	P	4500	miles
Rod, connecting	replace	63D30	C	12500	miles

Screen 1.43 -   Matrix of components names and maintenance

Screen 1.44 - Matrix of components names and maintenance
                parameters for the selected functional system
                with menu bar commands displayed.

From this screen, the user can select and initiate any
of the displayed commands.

<u>User Action:</u>
Copy - When the copy command is selected, the system
will copy all highlighted components and their
maintenance parameters into the copy buffer. Any
information already in the buffer will be lost. The
screen remains the same.

Describe - When this command is selected, the system
will display a detailed description of the highlighted
component. An example of the screen that will follow
is screen 1.45. If a block of components is currently
highlighted the system will display an error message
telling the user to highlight only one component when
selecting the describe command.

Switch - When this command is selected, the system will
switch the user back to the current Component
Maintenance Parameter Template. Next screen is 1.32.

Id New System - When this command is selected, the
system will return the user to the Identify Baseline
System menu. Next screen is 1.41.

<ESC> Returns the user to screen 1.43.

PATH: Baseline Library   MODE: Work
Copy   Describe   Switch   Id new system
Copy highlighted components and parameters

System name: UH-60 Black Hawk		Functional System: Engine			
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric
Fuel Injection	adjust	63D10	C	107.5	miles
Cylinder Head	replace	63D10	C	1500	miles
Crankshaft	repair	63D20	C	1120	miles
Seals, main	replace	63D10	C	1000	miles
Master cylinder	repair	63D20	C	2500	miles
Battery Pack	replace	43D20	C	750	time
Rod, connecting	inspect	63D20	P	4500	miles
Rod, connecting	replace	63D30	C	12500	miles

Screen 1.44 -   **Matrix of components names and maintenance parameters for the selected functional system with menu bar commands displayed.**

3-193

Screen 1.45 - Detailed description of a component in the
Baseline Library.

This is a purely informational screen to help the user
decide if this is truly a comparable component to one
in the system under evaluation.

User Actions:
The only two user actions that are available from this
screen are the following:

<ENTER> Returns the user to screen 1.43.

<ESC> Returns the user to screen 1.43.

Input File:
Product 5 MMAA Baseline Library.

Copy   Describe   Switch   Id new system
Present a detailed description of the highlighted component

System name: UH-60 Black Hawk		
Component Name	Maintenance Action	
Fuel Injection	adjust	
Cylinder Head	replace	
Crankshaft	repair	
Seals, main	replace	
Master cylinder	repair	
Battery Pack	replace	
Rod, connecting	inspect	
Rod, connecting	replace	63D30 C 12500	miles

FUEL INJECTION

Detailed description of the
fuel injection component
including the size, MIL spec #
manufacturer and any other
identifying information that
is applicable and available

**Screen 1.45 -   Detailed description of a component in the
Baseline Library.**

Screen 1.48 - Component Maintenance Parameter Template with
baseline maintenance parameters copied from
the Baseline Library pasted into the
government estimates portion of a cell.

<u>User Actions:</u>

The actions that are available to the user from this
screen are the same as those available from screen
1.36.

System name: UH-60 Black Hawk			Functional System: Engine		
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric
Fuel Injection	adjust	63D10	C	107.5	miles
Cylinder Head	repair	63D20	C	1020	miles
Crankshaft	repair	63D20	C	980	miles
	repair	63D20	C	1120	miles
Seals, main	replace				

Screen 1.48 -   **Component Maintenance Parameter Template with baseline maintenance parameters copied from the Baseline Library pasted into the government estimates portion of a cell.**

3.5.3 STEP 3 - Identify discrepancies between the government
baseline estimates and the contractor's design
estimates of Component Maintenance Parameters.

3.5.3.1 Input

External: Analyst judgement on the amount of tolerance he
or she will accept for deviations between the baseline data
and the contractor's estimates.

Internal: The Component Maintenance Parameter data files
containing both baseline data and contractor's estimates of
the maintenance parameters that were completed in Step 2.

3.5.3.2 Process
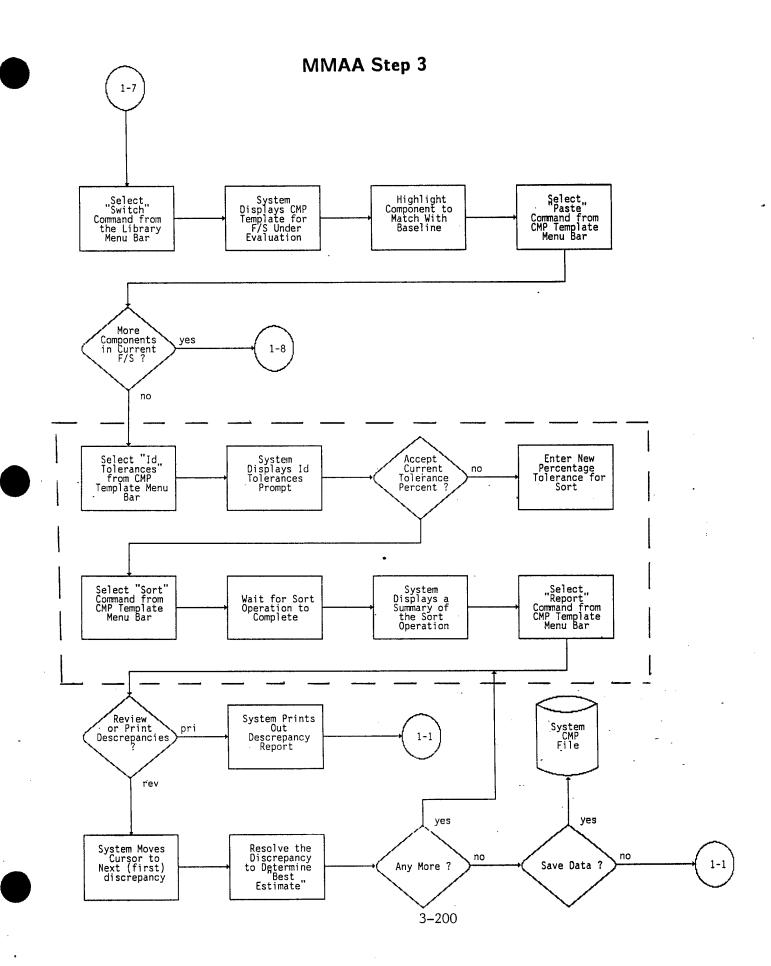
The performance of this step is dependent on the
availability of the contractor's design estimates for at
least some of the Component Maintenance Parameters. When
the contractor's design dosen't include any estimates of
Component Maintenance Parameters required by the MMAA, the
analyst will use the baseline government estimates as the
only input to the simulation model. When this is the case,
the analyst can skip this step.

When the a Component Maintenance Parameters Template
contains all of the baseline and contractor estimates that
are available, the analyst can have the system sort through
each pair of estimates for each component in the functional
system to identify discrepancies. However, before sorting
the Template, the analyst may want to change the tolerance
value that defines a discrepancy. The default tolerance
value is 10%. This means that when the Template is sorted,
any difference between the contractor and government

estimate that is within 10 persent is <u>not</u> considered a difference.

When the system has sorted a Component Maintenance Paremeter Template a summary of the sort operation is displayed to the user. In addition, a list of all identified discrepancies is stored in a data file. The user can then have the system either print the list of discrepancies or present them one by one on the screen for the analyst to review and resolve (Step).

The flow diagram of the process of performing Step 3 are included on the following page.

MMAA Step 3

(1-7)

```
┌─────────────┐      ┌─────────────┐      ┌─────────────┐      ┌─────────────┐
│   Select    │      │   System    │      │  Highlight  │      │   Select    │
│  "Switch"   │      │ Displays CMP│      │ Component to│      │   "Paste"   │
│Command from │─────▶│ Template for│─────▶│ Match With  │─────▶│ Command from│
│ the Library │      │  F/S Under  │      │  Baseline   │      │CMP Template │
│  Menu Bar   │      │ Evaluation  │      │             │      │  Menu Bar   │
└─────────────┘      └─────────────┘      └─────────────┘      └─────────────┘
```

```
    ╱╲
   ╱  ╲      More
  ╱    ╲  Components     yes
 ╱      ╲ in Current ───────────▶ ( 1-8 )
 ╲      ╱    F/S ?
  ╲    ╱
   ╲  ╱
    ╲╱
     │ no
```

```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
│                                                         │
│  ┌─────────────┐   ┌─────────────┐    ╱╲                │
│  │ Select "Id  │   │   System    │   ╱  ╲   Accept      ┌─────────────┐
│  │ Tolerances" │   │ Displays Id │  ╱    ╲  Current  no │  Enter New  │
│  │  from CMP   │──▶│ Tolerances  │─▶╲ Tolerance ──────▶ │ Percentage  │
│  │Template Menu│   │   Prompt    │   ╲Percent ?╱        │Tolerance for│
│  │     Bar     │   │             │    ╲  ╱              │    Sort     │
│  └─────────────┘   └─────────────┘     ╲╱               └─────────────┘
│                                                         │
│  ┌─────────────┐   ┌─────────────┐   ┌─────────────┐   ┌─────────────┐
│  │Select "Sort"│   │             │   │   System    │   │   Select    │
│  │Command from │   │Wait for Sort│   │ Displays a  │   │  "Report"   │
│  │CMP Template │──▶│Operation to │──▶│ Summary of  │──▶│ Command from│
│  │  Menu Bar   │   │  Complete   │   │  the Sort   │   │CMP Template │
│  │             │   │             │   │ Operation   │   │  Menu Bar   │
│  └─────────────┘   └─────────────┘   └─────────────┘   └─────────────┘
│                                                         │
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```

```
    ╱╲
   ╱  ╲ Review               ┌─────────────┐
  ╱    ╲ or Print   pri      │System Prints│
 ╱      ╲screpancies─────────▶│    Out      │──────▶ ( 1-1 )
 ╲      ╱    ?               │ Descrepancy │
  ╲    ╱                     │   Report    │
   ╲  ╱                      └─────────────┘
    ╲╱
     │ rev
```

System CMP File

```
┌─────────────┐   ┌─────────────┐     ╱╲              ╱╲
│System Moves │   │ Resolve the │    ╱  ╲            ╱  ╲
│  Cursor to  │   │ Descrepancy │   ╱    ╲  no      ╱    ╲  no
│Next (first) │──▶│to Determine │──▶╲Any More?──────▶╲Save Data?──────▶ ( 1-1 )
│ discrepancy │   │   "Best     │   ╲    ╱          ╲    ╱
│             │   │  Estimate"  │    ╲  ╱            ╲  ╱
└─────────────┘   └─────────────┘     ╲╱              ╲╱
                                   yes              yes
```

3-200

3.5.3.3 Output

The results of the sort operation will store a list of the differences or discrepancies between government and contractor estimates of Component Maintenance Parameters for each functional system of the system under evaluation. Any sort operation will only affect the discrepancy list for that functional system. However, each sort of the same functional system will replace the contents of the discrepancy file for that functional system.

3.5.3.4 User Interface

The user interfaces that apply to this step are described in detail on the following pages. Please note that all screens for the MMAA are labeled "Screen 1.X".

Screen 1.52 - Component Maintenance Parameters Template
with Id Tolerances selected on the menu bar
and the "Current Percentage Difference
Tolerance" prompt displayed.

A flashing cursor is displayed below the first
character of the current tolerance value.

User Action:
Using normal editing keys and procedures, the user can
change the tolerance value. The user will terminate
input by pressing the <ENTER> key. Next screen is
1.36. If the tolerance value entered is not within the
allowable range, an error message will display
explaining the tolerance range.

<ESC> Returns the user to screen 1.36 without changing
the current tolerance value.

| System name: UH-60 Black Hawk | | Functional System: Engine | | | | | |

Component Name	M					erational it Metric
Fuel Injection		Current Percentage Difference Tolerance: 10				les
		modify accept				
Cylinder Head	repair	63D20	C	1020	miles	
Crankshaft	repair	63D20	C	980	miles	
Seals, main	replace					

Screen 1.52 -   **Component Maintenance Parameters Template with Id Tolerances selected on the menu bar and the "Current Percentage Difference Tolerance" prompt displayed.**

Screen 1.55 - Component Maintenance Parameter Template with
                the "Sort operation in progress" message
                displayed.

At this point, the user must simply wait for the sort
operation to complete.

<u>User Actions:</u>
None. Next screen is 1.56.

System name: UH-60 Black Hawk		Functional System: Engine			
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric
Fuel Injection	adjust			107.5	miles
		Sort operation in progress.			
Cylinder Head	repair			1020	miles
Crankshaft	repair	63D20	C	980	miles
Seals, main	replace				

Screen 1.55 -   **Component Maintenance Parameter Template with the "Sort operation in progress" message displayed.**

Screen 1.56 - Sort operation summary screen.

This screen is informational the only accepted response is for the user to press the <ENTER> key. Next screen is 1.36.

Access Library   Paste   Id Tolerances   Sort   Report
Compare contract design and govt. estimates to identify discrepancies

System name: UH-60 Black Hawk   Functional System: Engine

Componen Name					rational t Metric	
	Sort operation complete.					
Fuel Injec	29 maintenance actions had no baseline estimate.				es	
	15 maintenance actions had no design estimate.					
Cylinder H	37 maintenance actions had discrepancies that were outside defined tolerances.				es	
	Press <ENTER> to continue.					
Crankshaft					es	
Seals, main	replace					

Screen 1.56 -   **Sort operation summary screen.**

Screen 1.58 - Component Maintenance Parameters Template
               with report options displayed on the menu
               bar.

From this screen, the user can choose to print out a
list of the identified discrepancies from the most
recent sort operation or review each discrepancy one by
one on-line.

<u>User Actions:</u>

Review - When this command is selected, the cell cursor
will move to the cell in the template where the first
discrepancy exists. When the user presses the <ENTER>
key the cursor will move to the cell with the next
identified discrepancy. An example of the next screen
is 1.62.

Print - When this command is selected, the system
begins to print the discrepancy list for the most
recent sort operation for this functional system. Next
screen is 1.66.

<ESC> Returns the system to screen 1.36.

System name: UH-60 Black Hawk   Functional System: Engine

Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric
Fuel Injection	adjust	63D10	C	107.5	miles
Cylinder Head	repair	63D20	C	1020	miles
Crankshaft	repair	63D20	C	980	miles
Seals, main	replace				

Screen 1.58 -   Component Maintenance Parameters Template with report options displayed on the menu bar.

Screen 1.62 - Component Maintenance Parameter Template with
a discrepancy cell highlighted.

From this screen, the user can either move on to Step 4
and resolve the discrepancy or review the next
discrepancy.

User Actions:
<ENTER> - If a discrepancy still exists between the
government and contractor estimates for this cell,
screen 1.63 displays (Step 4). If a discrepancy no
longer exists, pressing the <ENTER> key moves the cell
cursor to the next identified discrepancy.

<ESC> Returns the user to screen 1.58.

System name: UH-60 Black Hawk		Functional System: Engine				
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric	
Fuel Injection	adjust	63D10	C	107.5	miles	
	adjust	63D20				
Cylinder Head	repair	63D20	C	1020	miles	
Crankshaft	repair	63D20	C	980	miles	
Seals, main	replace					

Screen 1.62 -   Component Maintenance Parameter Template with a discrepancy cell highlighted.

Screen 1.66 -   Component Maintenance Parameter Template with
                report options displayed on the menu bar and
                the "PRINTING" message displayed.

From this screen, the user must wait for the printing
operation to complete.

<u>User Actions:</u>
None.   Next screen is 1.66A.

System name: UH-60 Black Hawk		Functional System: Engine			
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric
Fuel Injection	adjust	63D10	C	107.5	miles
	adjust	PRINTING			
Cylinder Head	repair		C	1020	miles
Crankshaft	repair	63D20	C	980	miles
Seals, main	replace				

Screen 1.66 -   Component Maintenance Parameter Template with report options displayed on the menu bar and the "PRINTING" message displayed.

Screen 1.66A - Component Maintenance Parameter Template with
report options displayed on the menu bar and
the "PRINTING COMPLETE" message displayed.

<u>User Actions:</u>

The only accepted user action is pressing the <ENTER>
key.   Next screen is 1.58.

System name: UH-60 Black Hawk		Functional System: Engine			
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric
Fuel Injection	adjust	63D10	C	107.5	miles
	adjust	PRINTING COMPLETED			
Cylinder Head	repair	Press <ENTER> to continue		1020	miles
Crankshaft	repair	63D20	C	980	miles
Seals, main	replace				

Screen 1.66A -   Component Maintenance Paremeter Template with
report options displayed on the menu bar and the
"PRINTING COMPLETE" message displayed.

3.5.4 STEP 4 - Resolve the discrupancies between the government
baseline estimates and the contractor's design
estimates of the Component Maintenance Parameters.

3.5.4.1 Input

External: The external inputs for resolving Component
Maintenance Parameter discrepancies are the following:

o   Maintenance Subject Matter Experts

o   System design documents including the maintenance
     task analysis

o   System design engineers

o   Analyst judgement
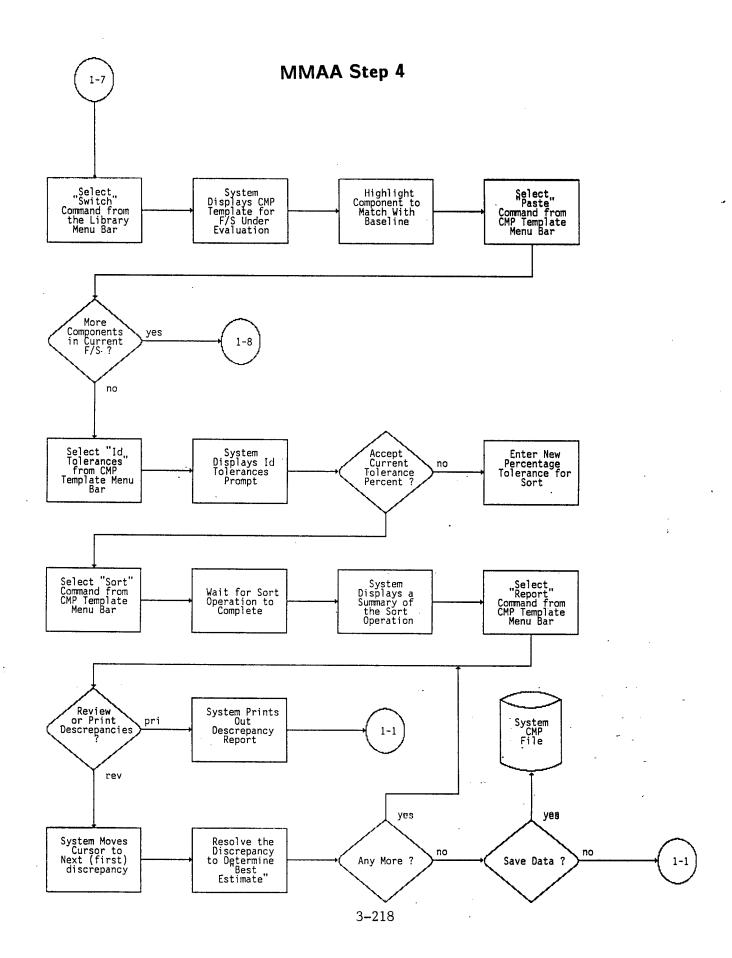
Internal: The Component Maintenance Parameter discrepancy
data file created in Step 3.

3.5.4.2 Process

When the MMAA has identified and stored discrepancies
between government and contractor estimates of Component
Maintenance Parameters for a particular Functional System,
the analyst can review each discrepancy one by one from the
Component Maintenance Parameter Template. The MMAA will
move the cell cursor to the next discrepancy. At this time,
the user of the MMAA can either resolve each discrepancy by
changing the baseline estimate to one that he or she
believes is a more realistic estmate based on further
analysis or leave the baseline estimate as it is. When the
analyst is finished editing a cell and presses the <ENTER>
key to move on to the next discrepancy, the MMAA checks to
see if there is still a discrepancy between the two

estimates. If there is still a discrepancy, the system will display a message to the user asking if he or she wants to remove this set of estimates from the discrepancy list. When the Maintenance Requirements Simulation model is executed (Step 6), the user will be able to choose to use either the government or contractor's estimates of Component Maintenance Parameters.

The flow diagrams of the process of performing Step 4 are included on the following page.

MMAA Step 4

(1-7)

| "Select" "Switch" Command from the Library Menu Bar | → | System Displays CMP Template for F/S Under Evaluation | → | Highlight Component to Match With Baseline | → | Select "Paste" Command from CMP Template Menu Bar |

More Components in Current F/S ? — yes → (1-8)

no

| Select "Id Tolerances" from CMP Template Menu Bar | → | System Displays Id Tolerances Prompt | → | Accept Current Tolerance Percent ? | — no → | Enter New Percentage Tolerance for Sort |

| Select "Sort" Command from CMP Template Menu Bar | → | Wait for Sort Operation to Complete | → | System Displays a Summary of the Sort Operation | → | Select "Report" Command from CMP Template Menu Bar |

Review or Print Descrepancies ? — pri → | System Prints Out Descrepancy Report | → (1-1)

rev

System CMP File

| System Moves Cursor to Next (first) discrepancy | → | Resolve the Discrepancy to Determine "Best Estimate" | → | Any More ? | — no → | Save Data ? | — no → (1-1)

yes

yes

3.5.4.3 Output

The output of the step is the Component Maintenance Parameter file that contains the contractor's estimates of maintenance parameters for each component and the government's best estimate of those same maintenance parameters.

3.5.4.4 User Interface

The user interfaces that apply to this step are described in detail on the following pages. Please note that all screens for the MMAA are labeled "Screen 1.X".

Screen 1.57 - Component Maintenance Parameter Template with menu bar commands displayed.

From this screen, the user can select the "Report" command to begin resolving discrepancies identified during the most recent "Sort" operation or choose any of the other menu bar commands.

<u>User Actions:</u>
Access Library - Next screen is 1.41.

Paste - Next screen is 1.48.

Id Tolerances - Next screen is 1.52.

Sort - Next screen is 1.55.

Report - Next screen is 1.58

<ESC> Returns the user to screen 1.31.

Access Library   Paste   Id Tolerances   Sort   Report
Report the discrepancies between contractor and government estimates

System name: UH-60 Black Hawk		Functional System: Engine				
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric	
Fuel Injection	adjust	63D10	C	107.5	miles	
Cylinder Head	repair	63D20	C	1020	miles	
Crankshaft	repair				miles	
Seals, main	replace					

Screen 1.57 -   Component Maintenance Parameter Template with menu bar commands displayed.

Screen 1.63 - Component Maintenance Parameter Template with
discrepancy message displayed.

From this screen, the user can choose to remove this
discrepancy from the list or leave it on the list and
move to the next discrepancy.

User Actions:
Y - Remove the current discrepancy from the list and
move the cell cursor to the next discrepancy. Next
screen is 1.62.

N - Move the cell cursor to the next discrepancy in the
list but don't remove this discrepancy from the list.

<ESC> Returns the user to screen 1.62 without moving on
to the next discrepancy.

System name: UH-60 Black Hawk		Functional System: Engine			
Component Name	Maintenance Action	MOS/Skill	Type (P/C)	MOUBF	Operational Unit Metric
Fuel Injection	adjust	63D10	C	107.5	miles
	adjust	63D20			
Cylinder Head	repair			1020	miles
Crankshaft	repair			980	miles
Seals, main	replace				

Discrepancy still exists.
Ok to remove from list ?

Enter y or n to continue.

Screen 1.63   Component Maintenance Parameter Template with discrepancy message displayed.

3.5.5 STEP 5 - Identify/develop parameters for each maintenance
         scenario to be analyzed in terms of maintenance
         manhour and headcount requirements, system
         reliability, and system availability.

3.5.5.1 Input

External: Mission requirements obtained from the System
Performance Requirements Estimation Aid (SPREA) in Product
1. Data on mission requirements obtained from the
Operational Mode Summary/Mission Profile, MAA/MADP results,
LSA, and the Army's Sample Data Collection system. Specific
external input data will include:

   o   mission name

   o   number of missions per day

   o   mean mission duration

   o   deviation (+ -) from mission mean time

   o   mean time between missions

   o   deviation (+ -) from mean time between missions

   o   operational units per mission for each
        hardware/software component in the system.

Internal: The internal input for this step will be the MMAA
software, the Component Maintenance Parameters data file,
the Mission/Condition Set file, and the judgement of the
Army analyst. The specific information that the analyst
will suppy includes:
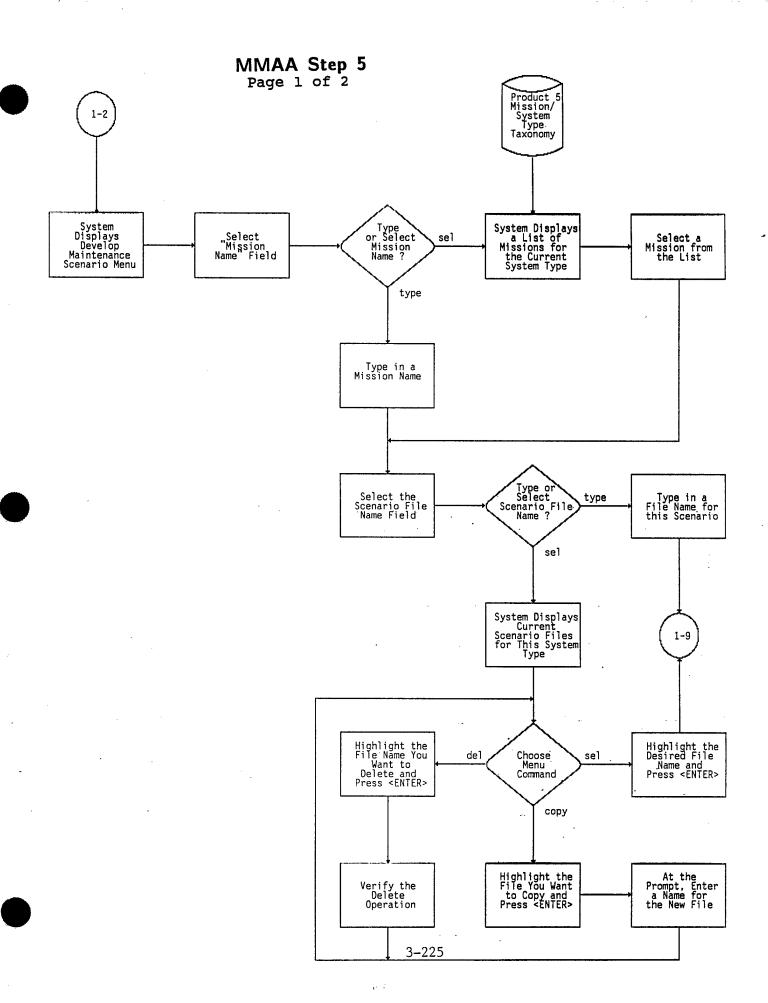
   o   A scenario file name

   o   The time span for the simulation
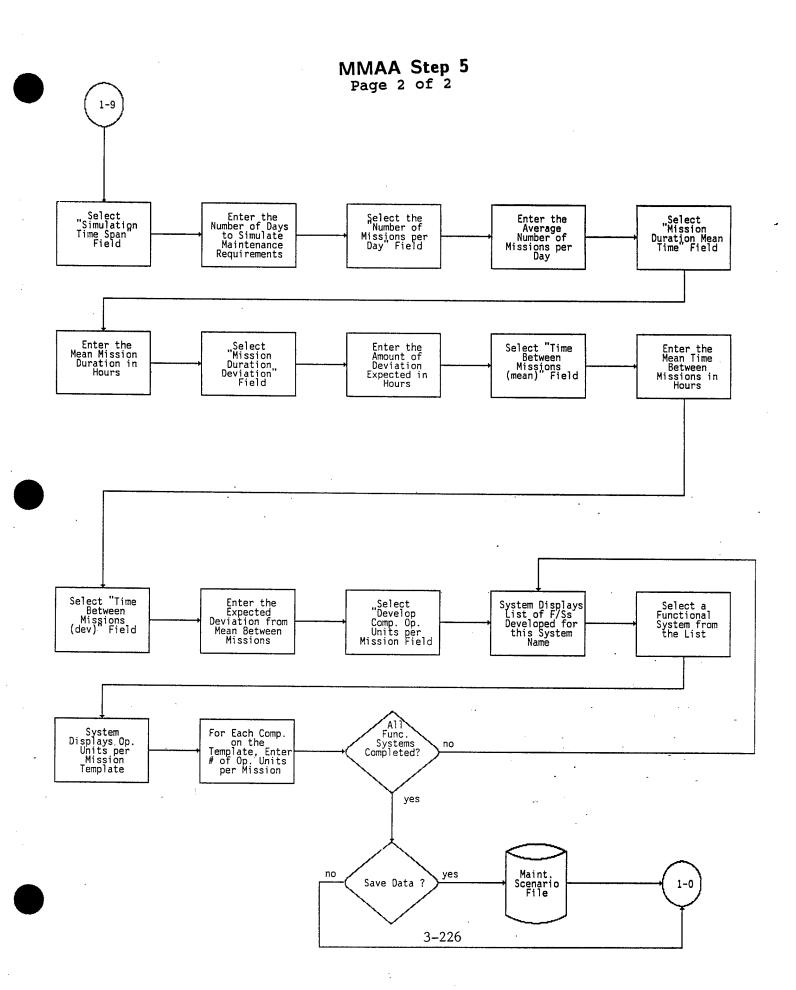
o   Judgement on selecting the other (external)
     mission parameters.

3.5.5.2 Process

    When the analyst has modified the baseline estimates of
Component Maintenance Parameters to reflect the best
available estimates, he or she will need to define a
maintenance scenario for the maintenance requirements
simulation. The analyst will create a maintenance scenario
to be used by the Maintenance Requirements Simulation model
by entering information into fields of the Develop
Maintenance Scenario menu. When the analyst selects
"Develop component operational units per mission" from the
Develop Maintenance Scenario menu, a second menu will
display a list of the functional currently saved for the
system under evaluation. When a functional system is
selected, the MMAA will display an Operational Units Per
Mission Template showing the names of each component in the
selected Functional System and the operational unit metric
for each component. This information will be obtained from
the Component Maintenance Parameters data file. The
Operational Units Per Mission Template will use the same
editing functionality as the Component Maintenance
Parameters Template. The analyst will use the editing and
keystroke procedures to enter the average number of
operational units per mission for each component.

    The flow diagrams of the process of performing Step 5
are included on the following pages.

```
                                                    ┌─────────┐
                                                    │Product 5│
                                                    │Mission/ │
                                                    │System   │
                                                    │Type     │
                                                    │Taxonomy │
                                                    └─────────┘
                                                         │
  ( 1-2 )                                                │
     │                                                   ▼
     ▼
┌──────────┐     ┌──────────┐      ◇              ┌───────────────┐     ┌───────────┐
│ System   │     │ Select   │    ╱Type ╲   sel    │System Displays│     │ Select a  │
│ Displays │     │ "Mission │──▶╱or Select╲──────▶│ a List of     │────▶│ Mission   │
│ Develop  │────▶│ Name"    │   ╲Mission ╱        │ Missions for  │     │ from      │
│Maintenance│    │ Field    │    ╲Name? ╱         │ the Current   │     │ the List  │
│Scenario Menu│  └──────────┘      ◇              │ System Type   │     └───────────┘
└──────────┘                       │              └───────────────┘           │
                                   │ type                                      │
                                   ▼                                           │
                              ┌──────────┐                                     │
                              │Type in a │                                     │
                              │ Mission  │                                     │
                              │  Name    │                                     │
                              └──────────┘                                     │
                                   │                                           │
                                   ◀───────────────────────────────────────────┘
                                   ▼
                              ┌──────────┐     ◇              ┌───────────┐
                              │Select the│   ╱Type ╲   type   │ Type in a │
                              │Scenario  │──▶╱or Select╲──────▶│File Name  │
                              │File Name │   ╲Scenario╱        │for this   │
                              │ Field    │   ╲File Name?╱      │ Scenario  │
                              └──────────┘     ◇              └───────────┘
                                               │ sel                  │
                                               ▼                      ▼
                                       ┌───────────────┐           ( 1-9 )
                                       │System Displays│
                                       │ Current       │
                                       │Scenario Files │
                                       │for This System│
                                       │ Type          │
                                       └───────────────┘
```

```
┌──────────────┐    del      ◇         sel    ┌──────────────┐
│Highlight the │         ╱Choose ╲            │Highlight the │
│File Name You │◀───────╱ Menu    ╲──────────▶│Desired File  │
│Want to       │        ╲Command ╱            │Name and      │
│Delete and    │         ╲       ╱            │Press <ENTER> │
│Press <ENTER> │          ◇                   └──────────────┘
└──────────────┘          │ copy
       │                  ▼
       ▼           ┌──────────────┐           ┌──────────────┐
┌──────────────┐   │Highlight the │           │   At the     │
│  Verify the  │   │File You Want │──────────▶│Prompt, Enter │
│   Delete     │   │to Copy and   │           │a Name for    │
│  Operation   │   │Press <ENTER> │           │the New File  │
└──────────────┘   └──────────────┘           └──────────────┘
```

3-225

(1-9)

```
┌──────────────┐     ┌──────────────┐     ┌──────────────┐     ┌──────────────┐     ┌──────────────┐
│    Select    │     │  Enter the   │     │  Select the  │     │  Enter the   │     │    Select    │
│ "Simulation  │────▶│ Number of Days│───▶│ "Number of   │────▶│   Average    │────▶│  "Mission    │
│ Time Span"   │     │ to Simulate  │     │ Missions per │     │  Number of   │     │ Duration Mean│
│    Field     │     │ Maintenance  │     │  Day" Field  │     │ Missions per │     │ Time" Field  │
│              │     │ Requirements │     │              │     │     Day      │     │              │
└──────────────┘     └──────────────┘     └──────────────┘     └──────────────┘     └──────────────┘
```

```
┌──────────────┐     ┌──────────────┐     ┌──────────────┐     ┌──────────────┐     ┌──────────────┐
│  Enter the   │     │    Select    │     │  Enter the   │     │ Select "Time │     │  Enter the   │
│ Mean Mission │     │  "Mission    │     │  Amount of   │     │   Between    │     │  Mean Time   │
│ Duration in  │────▶│  Duration,   │────▶│  Deviation   │────▶│   Missions   │────▶│   Between    │
│    Hours     │     │  Deviation"  │     │  Expected in │     │ (mean)" Field│     │  Missions in │
│              │     │    Field     │     │    Hours     │     │              │     │    Hours     │
└──────────────┘     └──────────────┘     └──────────────┘     └──────────────┘     └──────────────┘
```

```
┌──────────────┐     ┌──────────────┐     ┌──────────────┐     ┌──────────────┐     ┌──────────────┐
│ Select "Time │     │  Enter the   │     │    Select    │     │System Displays│    │   Select a   │
│   Between    │     │   Expected   │     │  "Develop    │     │ List of F/Ss │     │  Functional  │
│   Missions   │────▶│ Deviation from│───▶│  Comp. Op.   │────▶│ Developed for│────▶│  System from │
│ (dev)" Field │     │ Mean Between │     │  Units per   │     │ this System  │     │   the List   │
│              │     │   Missions   │     │ Mission Field│     │     Name     │     │              │
└──────────────┘     └──────────────┘     └──────────────┘     └──────────────┘     └──────────────┘
```

```
┌──────────────┐     ┌──────────────┐
│    System    │     │For Each Comp.│          ╱╲
│Displays Op.  │     │   on the     │         ╱  ╲  All
│ Units per    │────▶│Template, Enter│───────▶╱Func.╲
│   Mission    │     │# of Op. Units│        ╲Systems╱──── no ────┐
│   Template   │     │ per Mission  │         ╲Completed?        │
└──────────────┘     └──────────────┘          ╲╱                │
                                                 │                │
                                                yes               │
                                                 │                │
                                                 ▼                │
                                            ╱╲                    │
                                   no      ╱  ╲      yes    ┌──────────┐       ┌───────┐
                                  ◀───────╱Save ╲──────────▶│  Maint.  │──────▶│  1-0  │
                                          ╲Data ?╱          │ Scenario │       └───────┘
                                           ╲  ╱             │   File   │
                                            ╲╱              └──────────┘
```

3-226

3.5.5.3 Output

The output of this step is a Maintenance Scenario Paramaeters data file for each type of mission required of the system design that is being evaluated. Each scenario data file will be used as input for an execution of the Maintenance Requirements Simulation model.

3.5.5.4 User Interface

The user interfaces that apply to this step are described in detail on the following pages. Please note that all screens for the MMAA are labeled "Screen 1.X".

Screen 1.68 - Develop Maintenance Scenario menu.

The mission name field of the Develop Maintenance
Scenario menu contains the mission name that appears in
the Mission/Condition Set file for this evaluation.
From this menu, the user can select any of the menu
options in any order. However, the user must enter the
"Scenario file name:" before attempting to save the
maintenance scenario data. All of the fields on the
Develop Maintenance Scenario menu must be completed
before the Maintenance Requirements Simulation model
can be executed.

User Actions:
1.   Mission name: - When this option is selected the
      user is given the opportunity to either "type-in"
      or "select" a new mission name. Next screen is
      1.69.

2.   Scenario file name: - Lets the user choose to type
      in a new scenario file name or select an existing
      scanario file to modify. Next screen is 1.70.

3.   Simulation time span: - Displays a flashing cursor
      in the field so that the analyst can enter a
      number of days to simulate the maintenance
      requriements. Next screen is 1.72.

4.   Number of missions per day: - Displays a flashing
      cursor in the field and waits for analyst input.
      Next screen is 1.73.

5.   Mission duration mean time: - Displays a flashing
      cursor in the field and waits for analyst input.
      Next screen is 1.74.

6. Mission duration deviation (+ -): - Displays a
    flashing cursor in the field and waits for analyst
    input. Next screen is 1.75.

7. Time between missions: - Displays a flashing
    cursor in the field and waits for analyst input.
    Next screen is 1.76.

8. Time between missions (+ - dev): - Displays a
    flashing cursor in the field and waits for analyst
    input. Next screen is 1.77.

9. Develop component operational units per mission -
    Displays a list of the Functional Systems
    currently developed for this system. Next screen
    is 1.78.

<ESC> Returns the user to screen 1.1. If the user has
changed any information in any field of the Develop
Maintenance Scenario menu since the last time the file
was saved, a warning message will display.

Output Files:
All maintenance scenario information will be written to
the Scenario file name shown on the Develop Maintenance
Scenario menu. If the Scenario file name field is
blank, an error message will prompt the user to enter a
valid file name.

```
+---------------------------------------------------------------+
|               DEVELOP MAINTENANCE SCENARIO                    |
+---------------------------------------------------------------+
|                                                               |
|   1.  Mission name: Transport Combat Troops                   |
|   2.  Scenario file name:                                     |
|   3.  Simulation time span (days):                            |
|   4.  Number of missions per day:                             |
|   5.  Mission duration mean time (hours):                     |
|   6.  Mission duration deviation (+ -):                       |
|   7.  Time between missions (mean):                           |
|   8.  Time between missions (+ - dev):                        |
|                                                               |
|   9.  Develop component operational units per mission         |
|                                                               |
+---------------------------------------------------------------+
```

Screen 1.68 -   **Develop Maintenance Scenario menu.**

Screen 1.69 - Develop Maintenance Scenario menu with
               Mission name field highlighted and the
               "type-in" and "select" commands displayed.

From this screen, the user can choose to type-in a new
Mission name or to select a Mission name from a list of
missions for the current System Type.

<u>User Actions:</u>

type-in   Displays a flashing cursor in the Mission
           name field. Next screen is 69B??.

select   Displays a list of missions for the current
           System Type for the user to choose from.
           Next screen is 69A??.

<ESC>   Returns the user to screen 1.68.

```
┌─────────────────────────────────────────────────────────────┐
│                 DEVELOP MAINTENANCE SCENARIO                  │
├─────────────────────────────────────────────────────────────┤
│                                                               │
│   1.  Mission name: Transport Combat Troops                   │
│   2.  Scenario file name:                                     │
│   3.  Simulation time span (days):                            │
│   4.  Number of missions per day:                             │
│   5.  Mission duration mean time (hours):                     │
│   6.  Mission duration deviation (+ -):                       │
│   7.  Time between missions (mean):                           │
│   8.  Time between missions (+ - dev):                        │
│                                                               │
│   9.  Develop component operational units per mission         │
│                                                               │
├─────────────────────────────────────────────────────────────┤
│            type-in              select.                       │
└─────────────────────────────────────────────────────────────┘
```

Screen 1.69 -   Develop Maintenance Scenario menu with Mission
                  name field highlighted and the "type-in" and
                  "select" commands displayed.

3-232

Screen 1.69B - Develop Maintenance Scenario menu with a
                flashing cursor displayed in the Mission name
                field.

From this screen, the user can type-in a new mission
name for this scenario.

<u>User Actions:</u>
Using normal editing keys and procedures, the user will
enter a mission name. Input will be terminated by
pressing the <ENTER> key. Next screen is 1.68.

<ESC> Returns the user to screen 1.69.

```
+-----------------------------------------------------------+
|              DEVELOP MAINTENANCE SCENARIO                 |
+-----------------------------------------------------------+
|                                                           |
|   1. Mission name:___                                     |
|   2. Scenario file name:                                  |
|   3. Simulation time span (days):                         |
|   4. Number of missions per day:                          |
|   5. Mission duration mean time (hours):                  |
|   6. Mission duration deviation (+ -):                    |
|   7. Time between missions (mean):                        |
|   8. Time between missions (+ - dev):                     |
|                                                           |
|   9. Develop component operational units per mission      |
|                                                           |
+-----------------------------------------------------------+
|          type-in              select                      |
+-----------------------------------------------------------+
```

Screen 1.69B -   Develop Maintenance Scenario menu with a flashing
                   cursor displayed in the Mission name field.

Screen 1.69A - List of Missions for the current System Type.

From this screen, the user can select a mission name for this scenario.

<u>User Actions</u>:
Using normal menu selection procedures, the user will select a mission name. Next screen is 1.68.

<ESC> Returns the user to screen 1.69.

<u>Input Files</u>:
Product 5 Missions by System Type Taxonomy file.

```
┌─────────────────────────────────────┐─────────────────────────────────────┐
│            DEVELOP MAINT  │                                              │
│                           │      UTILITY HELICOPTER MISSIONS             │
│  ├─────────────────────── ├─────────────────────────────────────────────│
│  1.  Mission name:        │  1.  Transport Combat Troops                 │
│  2.  Scenario file name:  │  2.  Transport Logistical Supplies           │
│  3.  Simulation time span │  3.  Evacuate Casualties                     │
│  4.  Number of missions pe│  5.      .                                   │
│  5.  Mission duration mean│  6.      .                                   │
│  6.  Mission duration devi│  7.      .                                   │
│  7.  Time between missions└──────────────────────────────────────────────│
│  8.  Time between missions (+ - dev):                                     │
│                                                                           │
│  9.  Develop component operational units per mission                      │
│                                                                           │
│  ├───────────────────────────────────────────────────────────────────────│
│              type-in              select                                   │
└───────────────────────────────────────────────────────────────────────────┘
```

Screen 1.69A -   **List of Missions for the current System Type.**

Screen 1.70 - Develop Maintenance Scenario menu with
                "Scenario file name:" highlighted and the
                "type-in" and "select" commands displayed.

From this screen, the user can choose to either type-in
a new file name for this scenario or select an already
existing scenario file to modify.

User Actions:

type-in   A flashing cursor displays in the "Scenario
           file name" field. Next screen is 1.70A??.

select   A list of Scenario files that have been saved
           for the identified System Type displays.
           Next screen is 1.71.

<ESC>   Returns the user to screen 1.68.

```
┌─────────────────────────────────────────────────────────────┐
│             DEVELOP MAINTENANCE SCENARIO                      │
├─────────────────────────────────────────────────────────────┤
│                                                               │
│   1.  Mission name: Transport Combat Troops                   │
│   2.  Scenario file name:                                     │
│   3.  Simulation time span (days):                            │
│   4.  Number of missions per day:                             │
│   5.  Mission duration mean time (hours):                     │
│   6.  Mission duration deviation (+ -):                       │
│   7.  Time between missions (mean):                           │
│   8.  Time between missions (+ - dev):                        │
│                                                               │
│   9.  Develop component operational units per mission         │
│                                                               │
├─────────────────────────────────────────────────────────────┤
│            type-in              select                        │
└─────────────────────────────────────────────────────────────┘
```

Screen 1.70 -   **Develop Maintenance Scenario menu with "Scenario file name:" highlighted and the "type-in" and "select" commands displayed.**

Screen 1.70A - Develop Maintenance Scenario menu with
flashing cursor displayed in the "Scenario
file name" field.

From this screen, the user can type-in a new
Maintenance Scenario file name for this scenario.

<u>User Action:</u>
Using normal editing keys and procedures, the user will
enter a scenario file name. Input will be terminated
by pressing the <ENTER> key. Next screen is 1.68.

<ESC> Returns the user to screen 1.70.

```
┌─────────────────────────────────────────────────────────────────────┐
│                    DEVELOP MAINTENANCE SCENARIO                      │
├─────────────────────────────────────────────────────────────────────┤
│                                                                     │
│   1. Mission name: Transport Combat Troops                          │
│   2. Scenario file name: __                                         │
│   3. Simulation time span (days):                                   │
│   4. Number of missions per day:                                    │
│   5. Mission duration mean time (hours):                            │
│   6. Mission duration deviation (+ -):                              │
│   7. Time between missions (mean):                                  │
│   8. Time between missions (+ - dev):                               │
│                                                                     │
│   9. Develop component operational units per mission                │
│                                                                     │
├─────────────────────────────────────────────────────────────────────┤
│            type-in                  select                          │
└─────────────────────────────────────────────────────────────────────┘
```

Screen 1.70A -   Develop Maintenance Scenario menu with flashing
                  cursor displayed in the "Scenario file name"
                  field.

Screen 1.71 - List of Maintenance Scenario files for the
               current System Type.

    From this screen, the user can select, copy, or delete
    a scenario file.

    <u>User Actions:</u>
    select   The MMAA software reads the highlighted
              scenario file and displays the field
              parameters on the Develop Maintenance
              Parameters menu. Next screen is 1.72.

    copy   When the copy command is chosen the user can
              make an exact copy of an existing Maintenance
              Scenario file. The system displays a
              flashing cursor in a blank field directly
              below the highlighted file name. Next screen
              is 1.71A.

    delete   When the delete command is chosen, the user
              can delete the highlighted Maintenance
              Scenario file from the list. The system
              displays a delete verification message before
              actually deleting the file. Next screen is
              1.71B.

    <ESC>   Returns the user to screen 1.70.

    <u>Input Files:</u>
    Maintenance Scenario files for the current System Type.

```
┌─────────────────────────────────────────────────────────────┐
│              DEVELOP MAINTENANCE SCENARIO                     │
├──────────────────────────────────────┬──────────────────────┤
│                                       │ SCENARIO FILES FOR:  │
│  1. Mission name: Transport Combat Troo│ UTILITY HELICOPTER  │
│  2. Scenario file name:               │                      │
│  3. Simulation time span (days):      │                      │
│  4. Number of missions per day:       │    1. TRANSO1        │
│  5. Mission duration mean time (hours):│    2. TRANSO2       │
│  6. Mission duration deviation (+ -):  │    3. RECONO1       │
│  7. Time between missions (mean):     │                      │
│  8. Time between missions (+ - dev):  │                      │
│                                       ├──────────────────────┤
│  9. Develop component operational units│ select  copy  delete│
│                                       └──────────────────────┤
│                                                              │
├──────────────────────────────────────────────────────────────┤
│          type-in              select                          │
└──────────────────────────────────────────────────────────────┘
```

Screen 1.71 -   **List of Maintenance Scenario files for the current System Type.**

Screen 1.71A - List of Maintenance Scenario files with a
flashing cursor displayed in a blank field
directly below the file to be copied.

User Actions:

The system will wait for the user to enter a string of
allowable characters to be used as the name of the new
copy of the highlighted file. The user will terminate
the string by pressing the <ENTER> key. The file name
must begin with an alpha character and can contain up
to eight alpha, numeric, underscore, and hyphen
characters. All characters beyond the first eight will
be truncated. If the file name entered contains any
characters that are not allowed, a tone will sound and
an error message will display. Next screen is 1.71.

<ESC> Returns the user to screen 1.71.

Input Files:

Maintenance Scenario files for the current System Type.

```
┌─────────────────────────────────────────────────────┐
│              DEVELOP MAINTENANCE SCENARIO             │
├──────────────────────────────────┬──────────────────┤
│                                   │ SCENARIO FILES FOR:│
│  1. Mission name: Transport Combat Troo│ UTILITY HELICOPTER│
│  2. Scenario file name:           ├──────────────────┤
│  3. Simulation time span (days):  │                  │
│  4. Number of missions per day:   │  1.  TRANSO1     │
│  5. Mission duration mean time (hours):│  2.          │
│  6. Mission duration deviation (+ -):│  3.  TRANSO2   │
│  7. Time between missions (mean): │  4.  RECONO1     │
│  8. Time between missions (+ - dev):├──────────────────┤
│                                   │ select  copy  delete│
│  9. Develop component operational units└──────────────┘
│                                                       │
├───────────────────────────────────────────────────── ┤
│          type-in              select                  │
└───────────────────────────────────────────────────────┘
```

Screen 1.71A -   List of Maintenance Scenario files with a flashing
                  cursor displayed in a blank field directly below
                  the file to be copied.

Screen 1.71B - Verification message for deleting a scenario
file.

To avoid accidental deletion of a scenario file, the
delete operation must be verified by the user.

<u>User Actions:</u>

Y   The system deletes the highlighted file name on
     the list of scenario files. Next screen is 1.71.

N   The delete command is cancelled. Returns the user
     to screen 1.71 without performing the delete
     operation.

<ESC> Returns the user to screen 1.71 without
performing the delete operation. Pressing the <ESC>
key is functionally the same as pressing "N".

<u>Input Files:</u>
Maintenance Scenario files for the current System Type.

```
┌─────────────────────────────────────────────────────────────┐
│              DEVELOP MAINTENANCE SCENARIO                     │
├──────────────────────────────────────┬──────────────────────┤
│                                       │ SCENARIO FILES FOR:  │
│  1. Mission name: Transport Combat Troo│ UTILITY HELICOPTER  │
│  2. Scenari┌──────────────────────────┼──────────────────────┤
│  3. Simulat│                          │                      │
│  4. Number │ OK to Delete Scenario file ?│ 1.  TRANS01       │
│  5. Mission│                          │ 2.  NEWFILE          │
│  6. Mission│        Y or N ?          │ 3.  TRANS02          │
│  7. Time be└──────────────────────────┤ 4.  RECON01          │
│  8. Time between missions (+ - dev):  ├──────────────────────┤
│                                       │ select  copy  delete │
│  9. Develop component operational units└─────────────────────┘
│                                                               │
├───────────────────────────────────────────────────────────── │
│          type-in              select                          │
└───────────────────────────────────────────────────────────────┘
```

Screen 1.71B -   Verification message for deleting a scenario file.

Screen 1.72 - Develop Maintenance Scenario file with a
flashing cursor displayed in the "Simulation
time span" field.

From this screen, the user can enter the number of days
to simulate maintenance requirements.

<u>User Actions:</u>
The user will use numeric keys to enter the number of
days for the simulation. Next screen is 1.68 with the
number of days displayed.

<ESC> Returns the user to screen 1.68 without changing
the simulation time span.

```
+------------------------------------------------------------------+
|                  DEVELOP MAINTENANCE SCENARIO                    |
+------------------------------------------------------------------+
|                                                                  |
|   1.  Mission name: Transport Combat Troops                      |
|   2.  Scenario file name: TRANS01                                |
|   3.  Simulation time span (days): __                            |
|   4.  Number of missions per day:                                |
|   5.  Mission duration mean time (hours):                        |
|   6.  Mission duration deviation (+ -):                          |
|   7.  Time between missions (mean):                              |
|   8.  Time between missions (+ - dev):                           |
|                                                                  |
|   9.  Develop component operational units per mission            |
|                                                                  |
+------------------------------------------------------------------+
```

Screen 1.72 -   Develop Maintenance Scenario file with a flashing
                   cursor displayed in the "Simulation time span"
                   field.

Screen 1.73 - Develop Maintenance Scenario file with a
flashing cursor displayed in the "Number of
missions per day" field.

From this screen, the user can enter the expected
number of missions per day in order to simulate
maintenance requirements.

<u>User Actions:</u>
The user will use numeric keys to enter the number of
missions per day for the simulation. Next screen is
1.68 with the number of missions per day displayed.

<ESC> Returns the user to screen 1.68 without changing
the number of missions per day field.

```
+-----------------------------------------------------------+
|            DEVELOP  MAINTENANCE  SCENARIO                  |
+-----------------------------------------------------------+
|                                                           |
|    1.  Mission name: Transport Combat Troops              |
|    2.  Scenario file name: TRANS01                        |
|    3.  Simulation time span (days): 365                   |
|    4.  Number of missions per day: _                      |
|    5.  Mission duration mean time (hours):                |
|    6.  Mission duration deviation (+ -):                  |
|    7.  Time between missions (mean):                      |
|    8.  Time between missions (+ - dev):                   |
|                                                           |
|    9.  Develop component operational units per mission    |
|                                                           |
+-----------------------------------------------------------+
```

Screen 1.73 -   Develop Maintenance Scenario file with a flashing
                 cursor displayed in the "Number of missions per
                 day" field.

Screen 1.74 - Develop Maintenance Scenario file with a
flashing cursor displayed in the "Mission
duration mean time" field.

From this screen, the user can enter the mean duration
of one of the identified a missions.

<u>User Actions:</u>
The user will use numeric keys to enter the Mission
duration mean time. Next screen is 1.68 with the
mission duration mean time displayed.

<ESC> Returns the user to screen 1.68 without changing
the mission duration mean time.

```
┌──────────────────────────────────────────────────────────────┐
│                   DEVELOP  MAINTENANCE  SCENARIO               │
├──────────────────────────────────────────────────────────────┤
│                                                                │
│   1.  Mission name: Transport Combat Troops                    │
│   2.  Scenario file name: TRANS01                              │
│   3.  Simulation time span (days): 365                         │
│   4.  Number of missions per day: 6                            │
│   5.  Mission duration mean time (hours):___                   │
│   6.  Mission duration deviation (+ -):                        │
│   7.  Time between missions (mean):                            │
│   8.  Time between missions (+ - dev):                         │
│                                                                │
│   9.  Develop component operational units per mission          │
│                                                                │
└──────────────────────────────────────────────────────────────┘
```

Screen 1.74 -   Develop Maintenance Scenario file with a flashing
                 cursor displayed in the "Mission duration mean
                 time" field.

Screen 1.75 - Develop Maintenance Scenario file with a
flashing cursor displayed in the "Mission
duration deviation" field.

From this screen, the user can enter the expected
amount of deviation from the mean for mission length.

<u>User Actions:</u>
The user will use numeric keys to enter the deviation
amount. Next screen is 1.68 with the mission duration
deviation displayed.

<ESC> Returns the user to screen 1.68 without changing
the mission duration deviation.

```
┌─────────────────────────────────────────────────────────────┐
│                  DEVELOP MAINTENANCE SCENARIO                 │
├─────────────────────────────────────────────────────────────┤
│                                                               │
│   1. Mission name: Transport Combat Troops                    │
│   2. Scenario file name: TRANS01                              │
│   3. Simulation time span (days): 365                         │
│   4. Number of missions per day: 6                            │
│   5. Mission duration mean time (hours): 2                    │
│   6. Mission duration deviation (+ -): _                      │
│   7. Time between missions (mean):                            │
│   8. Time between missions (+ - dev):                        │
│                                                               │
│   9. Develop component operational units per mission          │
│                                                               │
└─────────────────────────────────────────────────────────────┘
```

Screen 1.75 -   Develop Maintenance Scenario file with a flashing
                   cursor displayed in the "Mission duration
                   deviation" field.

Screen 1.76 -   Develop Maintenance Scenario file with a
                flashing cursor displayed in the "Time
                between missions (mean)" field.

From this screen, the user can enter the mean number of
hours between missions.

<u>User Actions:</u>
The user will use numeric keys to enter the mean number
of hours between missions for the simulation. Next
screen is 1.68 with the mean number of hours between
missions displayed.

<ESC> Returns the user to screen 1.68 without changing
the mean number of hours between missions.

```
┌─────────────────────────────────────────────────────────────────┐
│                  DEVELOP MAINTENANCE SCENARIO                     │
├─────────────────────────────────────────────────────────────────┤
│                                                                   │
│   1. Mission name: Transport Combat Troops                        │
│   2. Scenario file name: TRANS01                                  │
│   3. Simulation time span (days): 365                             │
│   4. Number of missions per day: 6                                │
│   5. Mission duration mean time (hours): 2                        │
│   6. Mission duration deviation (+ -): .5                         │
│   7. Time between missions (mean): ▬                              │
│   8. Time between missions (+ - dev):                             │
│                                                                   │
│   9. Develop component operational units per mission              │
│                                                                   │
└─────────────────────────────────────────────────────────────────┘
```

Screen 1.76 -   **Develop Maintenance Scenario file with a flashing cursor displayed in the "Time between missions (mean)" field.**

Screen 1.77 - Develop Maintenance Scenario file with a
               flashing cursor displayed in the "Time
               between missions (+ - dev)" field.

    From this screen, the user can enter the expected + or
    - deviation from the mean time between missions.

    <u>User Actions:</u>
    The user will use numeric keys to enter the time
    between missions deviation the simulation. Next screen
    is 1.68 with the + - deviation of mean time between
    missions displayed.

    <ESC> Returns the user to screen 1.68 without changing
    the deviation of time between missions.

```
┌─────────────────────────────────────────────────────────────┐
│                 DEVELOP MAINTENANCE SCENARIO                  │
├─────────────────────────────────────────────────────────────┤
│                                                               │
│   1. Mission name: Transport Combat Troops                    │
│   2. Scenario file name: TRANS01                              │
│   3. Simulation time span (days): 365                         │
│   4. Number of missions per day: 6                            │
│   5. Mission duration mean time (hours): 2                    │
│   6. Mission duration deviation (+ -): .5                     │
│   7. Time between missions (mean): 2                          │
│   8. Time between missions (+ - dev): __                      │
│                                                               │
│   9. Develop component operational units per mission          │
│                                                               │
└─────────────────────────────────────────────────────────────┘
```

Screen 1.77 -   Develop Maintenance Scenario file with a flashing
                  cursor displayed in the "Time between missions (+
                  - dev)" field.

Screen 1.78 - Current List of Functional Systems for the
               system under eveluation.

From this screen, the user can select a Functional
System for which he or she will enter the number of
operational units that will be attributed to each
component for each mission.

User Actions:

Using normal menu selection procedures, the user will
select a functional system. Next screen is 1.79.

<ESC> Returns the user to screen 1.68.

```
+------------------------------------------------+
|  CURRENT LIST OF FUNCTIONAL SYSTEMS            |
+------------------------------------------------+
|                                                |
|        1. Hydraulics System                    |
|        2. Electrical System                    |
|        3. Communication System                 |
|        4. Engine                               |
|                                                |
+------------------------------------------------+
|      select                                    |
+------------------------------------------------+
```

Screen 1.78 -   **Current List of Functional Systems for the system
under eveluation.**

Screen 1.79 - Operational Units Per Mission Template with
the name and operational unit metric
displayed for each component in the
Functional System.

<u>User Actions:</u>
From this screen, the user can use normal template
editing keys and procedures to enter the number of
operational units per mission for each component in the
Functional system. Next screen is 1.68.

<ESC> Returns the user to screen 1.68.

3-261

OPERATIONAL UNITS PER MISSION		
System Name: UH-60 Black Hawk Functional System: Engine		
Component Name	Operational Unit Metric (%, rounds, miles)	Operational Units/Mission
Fuel Injection	miles	75
Cylinder Head	miles	75
Crank Shaft	miles	75
Seals, main	miles	
Master Cylinder	miles	
Battery Pack	% of mission time	

Screen 1.79 -   Operational Units Per Mission Template with the name and operational unit metric displayed for each component in the Functional System.

3.5.6 STEP 6 - Run the Maintenance Requirements Simulation model
to calculate manhour and headcount requirements,
system reliability, and system availability for
each maintenance scenario.

3.5.6.1 Input

<u>External:</u> None
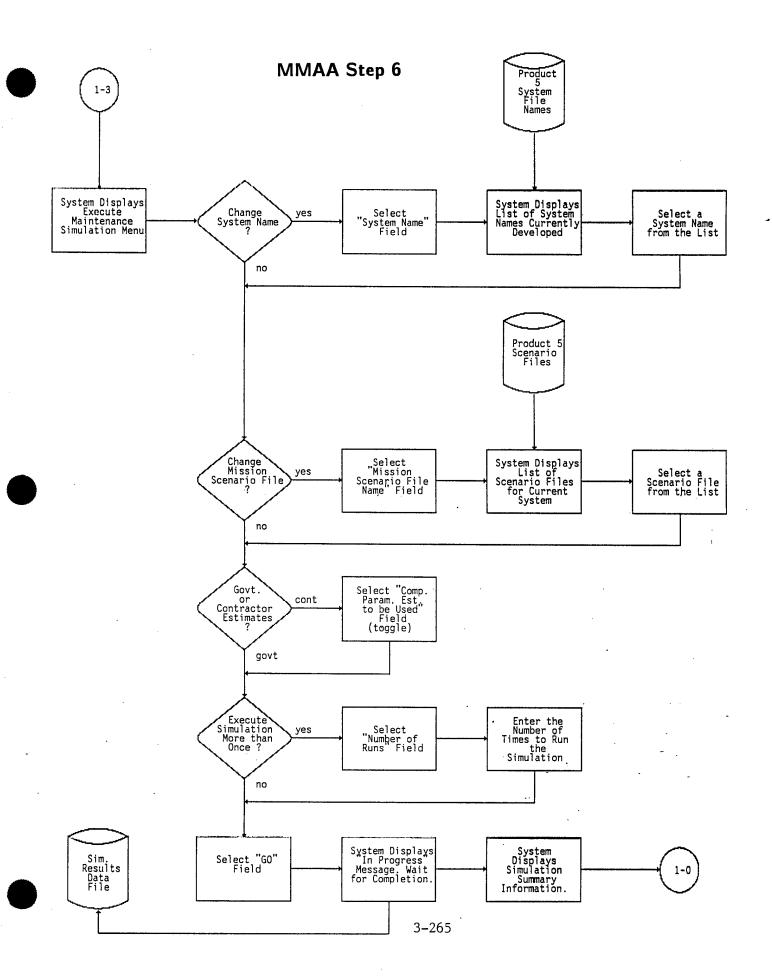
<u>Internal:</u> The Component Maintenance Parameter file
developed in Steps 1-4, the Maintenance Scenario file
developed in Step 5, and the Maintenance Requirements
Simulation model that is embedded within the MMAA.

3.5.6.2 Process

When all of the Component Maintenance Parameters and
Maintenance Scenario parameters have been identified for all
of the Functional Systems under evaluation, the analyst can
execute the Maintenance Requirements Simulation model. For
each execution of the model, the analyst will be able to
specify the System Name, the Maintenance Scenario file name,
and whether to use government or contractor estimates for
the simulation.

If any of the required input from the Component
Maintenance Paraemeter or Maintenance Scenario data files is
missing, incomplete or in error, the MMAA software will
issue an error message and, if possible, execution will
continue. If a fatal error is encountered, the execution
will terminate. Each error message that is encountered will
be written to an errors file for the current system and
scenario name. The errors file can be viewed and/or printed
out from the MDA Utilities Application.

The flow diagram of the process of performing Step 6 are included on the following page.

MMAA Step 6

Product 5 System File Names

System Displays Execute Maintenance Simulation Menu

Change System Name ? — yes → Select "System Name" Field → System Displays List of System Names Currently Developed → Select a System Name from the List

1-3

no

Product 5 Scenario Files

Change Mission Scenario File ? — yes → Select "Mission Scenario File Name" Field → System Displays List of Scenario Files for Current System → Select a Scenario File from the List

no

Govt. or Contractor Estimates ? — cont → Select "Comp. Param. Est. to be Used" Field (toggle)

govt

Execute Simulation More than Once ? — yes → Select "Number of Runs" Field → Enter the Number of Times to Run the Simulation

no

Sim. Results Data File

Select "GO" Field → System Displays In Progress Message. Wait for Completion. → System Displays Simulation Summary Information. → 1-0

3.5.6.3 Output

The output of the Maintenance Requirements Simulation model execution is the creation of two Simulation Results data files. The Maintenance Manpower Requirements file contains maintenance manhours by:

o   maintenance action
o   component
o   MOS/Skill Level
o   maintenance level (org, ds, gs)
o   maintenance type

The Maintenance Manpower Requirements file also contains an estimate of the maintenance headcount requirements.

The Mission Completion data file contains the following information:

o   Missions started
o   Missions completed
o   Missions missed
o   Missions aborted

3.5.6.4 User Interface

The user interfaces that apply to this step are described in detail on the following pages. Please note that all screens for the MMAA are labeled "Screen 1.X".

Screen 1.81 - Execute Maintenance Simulation menu.

From this screen, the user can identify a system name for the model execution, select a Maintenance scenario file name, and choose to use government or contractor estimates to run the simulation model. The Execute Maintenance Simulation menu will display as defaults the currently identified System Name and Maintenance Scenario file. However, the user may execute the simulation for any System Name and Maintenance Scenario file that resides on the disk.

User Actions:

1.   System Name - Lets the user choose to "type-in" or "select" a new System Name for the simulation. Next screen is 1.81A. If the System Name that the user enters is not on the working disk, an error message will display.

2.   Maintenance Scenario file name - Lets the user choose to "type-in" or "select" a new Maintenance Scenario file for the next simulation. Next screen is 1.82. If the System Name that the user enters is not on the working disk, an error message will display.

3.   Component Maintenance Parameter estimates to be used - Lets the user toggle between using government and contractor design estimates for the next simulation. Next screen is 1.85.

4.   GO - Begins execution of the Maintenance Requirements Simulation Model. Next screen 1.86.

<ESC> Returns the user to screen 1.1.

```
+--------------------------------------------------------------+
|              EXECUTE MAINTENANCE SIMULATION                  |
|--------------------------------------------------------------|
|                                                              |
|    1.  System Name:   UH-60 Black Hawk                       |
|    2.  Mission Scenario file name: TRANS01                   |
|    3.  Component parameter estimates to be used: govt.       |
|    4.  GO                                                    |
|                                                              |
|                                                              |
+--------------------------------------------------------------+
```

Screen 1.81 -   **Execute Maintenance Simulation menu.**

Screen 1.81A - Execute Maintenance Simulation menu with the
              "System Name" field highlighted and the
              "type-in" and "select" commands displayed.

From this screen, the user can choose to type-in a new
System Name for the next simulation execution or select
from a list of system names currently stored on the
disk.

User Actions:

type-in   A flashing cursor will display in a blank
           System name field. Next screen is 1.81B.

select   A list of System Names whose files are stored
           on the current working disk is displayed.
           Next screen is 1.81C.

<ESC>   Returns the user to screen 1.81.

```
┌──────────────────────────────────────────────────────────────────┐
│                  EXECUTE MAINTENANCE SIMULATION                    │
├──────────────────────────────────────────────────────────────────┤
│                                                                    │
│    1.  System Name:   UH-60 Black Hawk                             │
│    2.  Mission Scenario file name: TRANS01                         │
│    3.  Component parameter estimates to be used: govt.             │
│    4.  GO                                                          │
│                                                                    │
│                                                                    │
├──────────────────────────────────────────────────────────────────┤
│          type-in                             select                │
└──────────────────────────────────────────────────────────────────┘
```

Screen 1.81A -   Execute Maintenance Simulation menu with the
                  "System Name" field highlighted and the "type-in"
                  and "select" commands displayed.

Screen 1.81B - Execute Maintenance Simulation menu with a
flashing cursor displayed in the System Name
field.

<u>User Actions:</u>

Using norman editing keys and procedures, the user will
enter a System Name. Next screen is 1.81. If the
System Name that the user enters does not reside on the
current working disk, an error message will display.

<ESC> Returns the user to screen 1.81.

```
┌────────────────────────────────────────────────────────────────┐
│              EXECUTE MAINTENANCE SIMULATION                    │
├────────────────────────────────────────────────────────────────┤
│                                                                │
│   1.  System Name: ___                                         │
│   2.  Mission Scenario file name: TRANSO1                      │
│   3.  Component parameter estimates to be used: govt.          │
│   4.  GO                                                       │
│                                                                │
│                                                                │
├────────────────────────────────────────────────────────────────┤
│        type-in                          select                 │
└────────────────────────────────────────────────────────────────┘
```

Screen 1.81B -   Execute Maintenance Simulation menu with a
flashing cursor displayed in the System Name
field.

Screen 1.81C - List of System Names whose files are saved on
the current working disk.

   <u>User Actions:</u>
   Using normal menu selection procedures, the user will
   select a System Name from the list. Next screen is
   1.81.

   <ESC> Returns the user to screen 1.81.

```
┌────────────────────────────────────────────────────┐
│          EXECUTE MAINTENANCE SIMULATIO ┌────────────────────────────┐
│       ─────────────────────────────────│ CURRENT SYSTEM NAMES       │
│                                         │                            │
│   1.  System Name:                      │ 1.  UN-60 Black Hawk       │
│   2.  Mission Scenario file name: TRANS01│ 2.  UH-1 Iroquois         │
│   3.  Component parameter estimates to be│ 3.  AH-1 Apache           │
│   4.  GO                                 │ 4.  AH-1S Cobra           │
│                                          │ 5.  M60 Tank              │
│                                          │                            │
│   ───────────────────────────────────────────────── │                │
│           type-in                   select           │                │
└──────────────────────────────────────────────────────┘
```

Screen 1.81C -   **List of System Names whose files are saved on the
                 current working disk.**

3-274

Screen 1.82 - Execute Maintenance Simulation menu with the "Maintenance Scenario file name" field highlighted and the "type-in" and "select" commands displayed.

From this screen, the user can choose to type-in a new Maintenance Scenario file name for the next simulation execution or to select a new Maintenance Scenario file for this System Name from a list of those residing on the current working disk.

<u>User Actions:</u>

type-in   A flashing cursor will display in a blank "Maintenance Scenario file name" field. Next screen is 1.82A.

select   A list of Maintenance Scenario files for the current System Name displays. Next screen is 1.83.

<ESC>   Returns the user to screen 1.81.

```
┌─────────────────────────────────────────────────────────────┐
│              EXECUTE MAINTENANCE SIMULATION                  │
├─────────────────────────────────────────────────────────────┤
│                                                             │
│   1. System Name:  UH-60 Black Hawk                         │
│   2. Mission Scenario file name: TRANS01                    │
│   3. Component parameter estimates to be used: govt.        │
│   4. GO                                                     │
│                                                             │
│                                                             │
├─────────────────────────────────────────────────────────────┤
│        type-in                        select                │
└─────────────────────────────────────────────────────────────┘
```

Screen 1.82 -   Execute Maintenance Simulation menu with the
                 "Maintenance Scenario file name" field highlighted
                 and the "type-in" and "select" commands displayed.

Screen 1.82A - Execute Maintenance Simulation menu with the
             "Maintenance Scenario file name" field
             highlighted and a flashing cursor displayed.

    User Actions:

    Using normal editing keys and procedures, the user will
    enter the name of an existing Maintenance Scenario file
    to be used for the next simulation model execution.
    Next screen is 1.81. If the file name entered does not
    reside on the current working disk, an error message
    will be displayed.

    <ESC> Returns the user to screen 1.81 with the
    previous file name displayed.

```
┌─────────────────────────────────────────────────────────────┐
│              EXECUTE MAINTENANCE SIMULATION                   │
├─────────────────────────────────────────────────────────────┤
│                                                               │
│   1. System Name:  UH-60 Black Hawk                           │
│   2. Mission Scenario file name: _                            │
│   3. Component parameter estimates to be used: govt.          │
│   4. GO                                                        │
│                                                               │
│                                                               │
├─────────────────────────────────────────────────────────────┤
│         type-in                         select                │
└─────────────────────────────────────────────────────────────┘
```

Screen 1.82A -   Execute Maintenance Simulation menu with the
                 "Maintenance Scenario file name" field highlighted
                 and a flashing cursor displayed.

Screen 1.83 - List of Maintenance Scenario files that are
saved on the current working diskette for the
identified System Name.

User Actions:

Using normal menu selection procedures, the user will
select a Maintenance Scenario file from the list for
the next simulation model execution. Next screen is
1.81. If the current working disk does not contain any
Maintenance Scenario files for the identified System
Name, a message will display.

<ESC> Returns the user to screen 1.81 with the
previous file name displayed in the "Maintenance
Scenario file name" field.

```
┌─────────────────────────────────────────────────────────────┐
│              EXECUTE MAINTENANCE SIMULATION                   │
├──────────────────────────────────────────────────────┬───────┘
│                                              ┌───────────────────────────────┐
│  1.  System Name:   UH-60 Black Hawk         │                               │
│  2.  Mission Scenario file name: TRANS01     │  SCENARIO FILES FOR:          │
│  3.  Component parameter estimates to be us   │  UN-60 BLACK HAWK             │
│  4.  GO                                       ├───────────────────────────────┤
│                                               │                               │
│                                               │     1.  TRANS01               │
├───────────────────────────────────────────┤     2.  TRANS02               │
│          type-in                    select   │     3.  RECON01               │
└───────────────────────────────────────────────┴───────────────────────────────┘
```

Screen 1.83 -   List of Maintenance Scenario files that are saved
                   on the current working diskette for the identified
                   System Name.

Screen 1.85 - Execute Maintenance Simulation menu with the
               "Component parameter estimates to be used"
               field highlighted.

From this screen, the user can toggle between using
government estimates of Component Maintenance
Parameters for the next execution of the simulation
model and using the contractor's design estimates.

<u>User Actions:</u>
When this field is highlighted, each time the user
presses the <ENTER> key the field entry toggles between
"govt." and "design". Next screen is 1.81.

<ESC> Returns the user to screen 1.1.

```
┌──────────────────────────────────────────────────────────┐
│              EXECUTE MAINTENANCE SIMULATION                │
├──────────────────────────────────────────────────────────┤
│                                                            │
│  1.  System Name:  UH-60 Black Hawk                        │
│  2.  Mission Scenario file name: TRANS01                   │
│  3.  Component parameter estimates to be used: design      │
│  4.  GO                                                    │
│                                                            │
│                                                            │
└──────────────────────────────────────────────────────────┘
```

Screen 1.85 -   Execute Maintenance Simulation menu with the
                  "Component parameter estimates to be used" field
                  highlighted.

Screen 1.86 - Execute Maintenance Simulation with
                "Simulation in Progress" message displayed.

    <u>User Actions:</u>

None. Next screen 1.87.

    <u>Input Files:</u>

Component Maintenance Parameter file and Maintenance
Scenario file for the identified system.

```
┌────────────────────────────────────────────────────────────┐
│                EXECUTE MAINTENANCE SIMULATION                │
├────────────────────────────────────────────────────────────┤
│                                                              │
│   1.  System Name:   UH-60 Black Hawk                        │
│   2.  Mission Scenario file name: TRANS01                    │
│   3.  Component parameter estimates to be used: govt.        │
│   4.  GO                                                     │
│                    ┌─────────────────────┐                   │
│                    │  SIMULATION         │                   │
└────────────────────│  IN PROGRESS        │───────────────────┘
                     │                     │
                     └─────────────────────┘
```

Screen 1.86 -   Execute Maintenance Simulation with "Simulation in Progress" message displayed.

Screen 1.87 - Simulation Complete summary screen.

This screen gives the user a summary of the simulation outcomes.

<u>User Actions:</u>

P   Pressing this key will cause the simulation summary screen to be printed. Next screen is 1.81.

<ENTER> Returns the user to screen 1.81.

<ESC> Returns the user to screen 1.81.

```
┌─────────────────────────────────────────────────────────┐
│                  SIMULATION COMPLETE                      │
│                                                           │
│  Total Maintenance Manhour Requirements:  12098           │
│  Total Number of Maintenance Jobs:  23                    │
│  Total Number of Maintenance Tasks:  2203                 │
│  Maximum Maintenance Headcount:  41                       │
│                                                           │
│  Simulation Errors Encountered: 0                         │
│                                                           │
├─────────────────────────────────────────────────────────┤
│              Press <ENTER> to continue                    │
└─────────────────────────────────────────────────────────┘
```

Screen 1.87 -   Simulation Complete summary screen.

3.5.7 STEP 7 - Analyze the results of the Maintenance Requirements Simulation Model execution.

In terms of the maintenance jobs that are required, the maintenance tasks that make up each job, the maintenance manhours and headcount requirements, system availability, and system reliability. These maintenance requirements are then compared to the system performance requirements identified in the Product 1 SPREA analysis and the Product 2 manpower constraints.

3.5.7.1 Inputs

External: The System RAM Criteria file and the Corrective Maintenance Criteria files that are an output of the Product 1 SPREA analysis and the Maintenance Manpower Constraints and Source MOS Reports that are an output of the Product 2 MCEA analysis.

Internal: The Maintenance Manpower Requirements file and the Mission Completion files that were produced as an output of the execution of the Maintenance Requirements Simulation Model in Step 6.

3.5.7.2 Process

The execution results of the Maintenance Requirements Simulation Model are stored in two data files that will serve as a relational data base of maintenance requirements information. A maintenance reports generator will be developed to allow the user to obtain, combine, and display or print information from the results data files in different ways.

The reports generator will produce two basic types of reports automatically that the analyst will use to determine the overall maintenance requirements for the system design. The first is a Maintenance Manhour Requirements report. This report is a table of information that lists maintenance requirements by maintenance job, maintenance action, component, maintenance organization, and maintenance type. The analyst will be able to sort and display the information in the report for any of the above categories. For example, the analyst can choose to display all of the maintenance requirements for each maintenance job or to display the maintenance requirements by component or functional system.
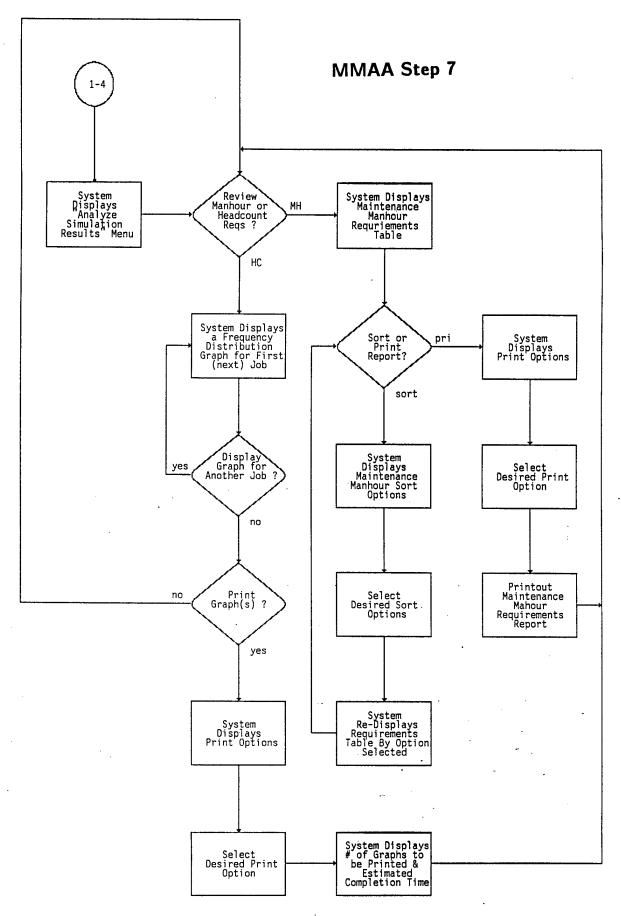
The second type of report that is produced automatically is the Maintenance Headcount Requirements. This report is actually a set of histograms that identify the actual numbers of people required for each maintenance job and the percentage of time that number of people were needed to maintain the system. The analyst will need both the Maintenance Manhour Requirements summary report and the Maintenance Headcount Requirements histograms to accurately evaluate the maintenance requirements for the proposed system design.

The Analyze Simulation Results portion of the MMAA software will also give the analyst an estimate of system availability and reliability based on missions missed, missions completed, and missions aborted during the simulation. The section 4 description of the algorithms used to develop the Maintenance Requirements Simulation Model contains a description of the algorithmes used to calculate availability and reliability.

The analyst will compare the output that is obtained from each execution of the model to the data contained in

the Maintenance Manpower Constraints Report and the Source
MOS Report obtained from the Product 2 MCEA analysis and the
performance requirements obtained from the System RAM
Criteria file and the Corrective Maintenance Criteria file
that were derived during the Product 1 SPREA analysis.

The flow diagram of the process of performing Step 7
are included on the following page.

MMAA Step 7

(1-4)

```
┌──────────────┐
│   System     │
│   Displays   │          ╱ Review  ╲              ┌──────────────┐
│   Analyze    │         ╱ Manhour or ╲    MH       │System Displays│
│  Simulation  │────────▶ Headcount   ─────────────▶│ Maintenance  │
│ Results Menu │         ╲   Reqs ?  ╱              │   Manhour    │
└──────────────┘          ╲         ╱               │ Requirements │
                              │                     │    Table     │
                              │ HC                  └──────────────┘
                              ▼                             │
                     ┌──────────────┐                      ▼
                     │System Displays│              ╱  Sort or  ╲    pri    ┌──────────────┐
                     │ a Frequency  │              ╱    Print    ╲──────────▶│   System     │
                     │ Distribution │◀────        ◀   Report?    ╲          │   Displays   │
                     │Graph for First│            ╲             ╱           │ Print Options│
                     │  (next) Job  │              ╲           ╱            └──────────────┘
                     └──────────────┘               ╲  sort  ╱                     │
                              │                          │                         ▼
                              ▼                          ▼                  ┌──────────────┐
       yes            ╱ Display  ╲              ┌──────────────┐            │   Select     │
     ◀───────────────◀  Graph for  ╲            │   System     │            │Desired Print │
                     ╲ Another Job ?╱           │   Displays   │            │   Option     │
                      ╲           ╱             │ Maintenance  │            └──────────────┘
                          │                     │Manhour Sort  │                   │
                          │ no                  │   Options    │                   ▼
                          ▼                     └──────────────┘            ┌──────────────┐
       no          ╱   Print   ╲                       │                   │  Printout    │
     ◀────────────◀   Graph(s) ? ╲                     ▼                   │ Maintenance  │
                    ╲           ╱              ┌──────────────┐            │   Mahour     │
                     ╲         ╱               │   Select     │            │ Requirements │
                         │                     │Desired Sort  │            │   Report     │
                         │ yes                 │   Options    │            └──────────────┘
                         ▼                     └──────────────┘
                  ┌──────────────┐                     │
                  │   System     │                     ▼
                  │   Displays   │              ┌──────────────┐
                  │ Print Options│◀─────────────│   System     │
                  └──────────────┘              │ Re-Displays  │
                         │                      │ Requirements │
                         │                      │Table By Option│
                         ▼                      │  Selected    │
                  ┌──────────────┐              └──────────────┘
                  │   Select     │              ┌──────────────┐
                  │Desired Print │              │System Displays│
                  │   Option     │─────────────▶│ # of Graphs to│
                  └──────────────┘              │ be Printed &  │
                                                │   Estimated   │
                                                │Completion Time│
                                                └──────────────┘
```

3-290

3.5.7.3 Output

The output of this step is the identification of potential design deficiencies in terms of 1) the estimated manpower required to maintain the system as compared to the manpower constraints and 2) the estimated availability and reliability of the system as related to maintenance requirements compared to the system performance requirements determined in the Product 1 SPREA analysis.

Another output of this step is a set of maintenance reports of manhour and headcount requirments reports that can be used in the Trade-off Analysis process that will be aided by product 6 of the (MPT)^2 effort.

3.5.7.4 User Interface

The user interfaces that apply to this step are described in detail on the following pages. Please note that all screens for the MMAA are labeled "Screen 1.X".

Screen 1.89 - Analyze Simulation Results menu.

From this screen, the user can use normal menu
selection procedures to review the stored results of
the most recent Maintenance Requirements Simulation
Model execution.

User Actions:

1.   Review Manhour Requirements - Next screen is 1.90.

2.   Review Headcount Requirements - Next screen is
      1.92.

3.   Review System Availability Estimates - Next screen
      is 1.106.

4.   Review System Reliability Estimates - Next screen
      is 1.107.

5.   Review Simulation Errors file - Next screen is
      1.108.

<ESC> Returns the user to screen 1.1.

```
┌─────────────────────────────────────────────────┐
│            ANALYZE SIMULATION RESULTS             │
├─────────────────────────────────────────────────┤
│   1.  Review Manhour Requirements                 │
│   2.  Review Headcount Requirements               │
│   3.  Review System Availability                  │
│   4.  Review System Reliability                   │
│   5.  Review Simulation Errors                    │
│                                                   │
└─────────────────────────────────────────────────┘
```

Screen 1.89 -   Analyze Simulation Results menu.

Screen 1.90 - Maintenance Manhour Requirements report.

This report shows:
- maintenance jobs
- maintenance actions per job
- the component for each maintenance action
- the number of times the maintenance action was performed
- the organization that performed the maintenance
- the type of maintenance
- the total manhours spent performing the maintenance

The Maintenance Manhour Requirements report can be sorted by any of the categories listed above and re-displayed in the new format. It can also be printed in various formats.

From this screen, the user can use arrow keys to scroll through pages of the report or access the menu bar commands to sort or print the report or to switch to view the maintenance headcount requirements.

User Actions:
Using the arrow keys, the user can scroll through the report.

F9 - Displays the menu bar commands. Next screen is 1.91.

<ESC> - Returns the user to screen 1.89.

MAINTENANCE MANHOUR REQUIREMENTS						
Job (MOS/Skill)	Maintenance Action	Component Name	#	Org	Type	Total Manhours
63D10	replace	Cylinder head	3	ds	C	21.2
	repair	Fuel Injection	7	gs	C	28.0
	repair	Master				
		Cylinder	1	gs	C	12.2
	inspect	Fuel Injection	12			9.5
	inspect	Crankshaft	38	gs	P	17.0
	remove/					
	replace	Seals, main	1	gs	C	12.5
subtotals			* 62			* 100.4
63D20	repair	Rod, connecting	2	ds	C	10.5
	remove/					
	replace	Crankshaft	1	ds	C	13.0
	repair	Engine mount	3	ds	C	9.5
	inspect	Engine mount	27	gs	P	13.5

Screen 1.90 -   Maintenance Manhour Requirements report.

Screen 1.91 - Maintenance Manhour Requirements report with menu bar commands displayed.

From this screen, the user can switch to the Maintenance Headcount Requirements report, sort and display the maintenance requirements data by categories, or print the Maintenance Manhour Requirements report.

User Actions:

Headcount   When this command is selected, the user can review the Maintenance Headcount Requirements reports. Next screen is 1.92.

sort   When this command is selected the user can sort the Maintenance Manhour Requirements data by one of the defined categories. Next screen is 1.99.

print   When this commanc is selected, the user can print all or portions of the Maintenance Manhour Requirements report. Next screen is 1.103.

<ESC>   Returns the user to screen 1.90.

MAINTENANCE MANHOUR REQUIREMENTS						
Job (MOS/Skill)	Maintenance Action	Component Name	#	Org	Type	Total Manhours
63D10	replace	Cylinder head	3	ds	C	21.2
	repair	Fuel Injection	7	gs	C	28.0
	repair	Master Cylinder	1	gs	C	12.2
	inspect	Fuel Injection	12			9.5
	inspect	Crankshaft	38	gs	P	17.0
	remove/ replace	Seals, main	1	gs	C	12.5
subtotals			* 62			* 100.4
63D20	repair	Rod, connecting	2	ds	C	10.5
	remove/ replace	Crankshaft	1	ds	C	13.0
	repair	Engine mount	3	ds	C	9.5
	inspect	Engine mount	27	gs	P	13.5

Screen 1.91 -   Maintenance Manhour Requirements report with menu
                bar commands displayed.

3-297

Screen 1.92 - Maintenance Headcount Requirements histogram.

The histogram that displays is for the same MOS/Skill Level that is currently highlighted in the Maintenance Manhour Requirements Report. The user can page through the histograms for all of the maintenance jobs by repeatedly pressing the <ENTER> key. The user can choose to print the headcount histogram(s) or switch back to the Maintenance Manhour Requirements report by accessing the menu bar commands.
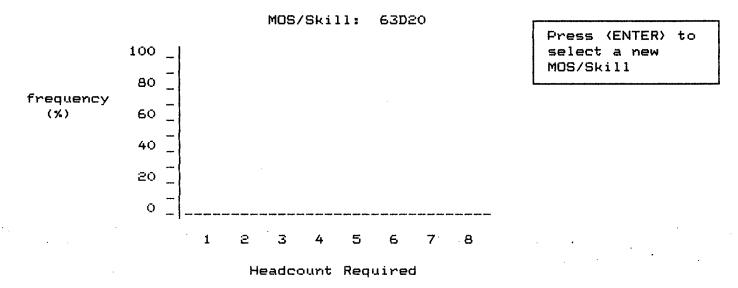
User Actions:

<ENTER>   Displays a headcount histogram for the next maintenance job.

F9   Displays the menu bar commands for this screen. Next screen is 1.93.

<ESC>   Returns the user to screen 1.89.

MAINTENANCE HEADCOUNT REQUIREMENTS

MOS/Skill: 63D20

```
                                              ┌─────────────────────┐
           100 _  |                           │ Press <ENTER> to    │
                 -                            │ select a new        │
            80 _  -                           │ MOS/Skill           │
                 -                            └─────────────────────┘
frequency        -
   (%)     60 _  -
                 -
            40 _  -
                 -
            20 _  -
                 -
             0 _  -
                 |_____

                 1    2    3    4    5    6    7    8

                      Headcount  Required
```

Screen 1.92 -   Maintenance Headcount Requirements histogram.

Screen 1.93 - Maintenance Headcount Requirements histogram
                 with menu bar commands displayed.

     From this screen, the user can choose to print either
     the currently displayed headcount histogram, the
     headcount histograms for all of the maintenance jobs
     required for the current system or to display the
     Maintenance Manhour Requirements report.

     User Actions:

     Manhours Displays the Maintenance Manhour Requirements
                report. Next screen is 1.90.

     Print   Displays the print menu. Next screen is
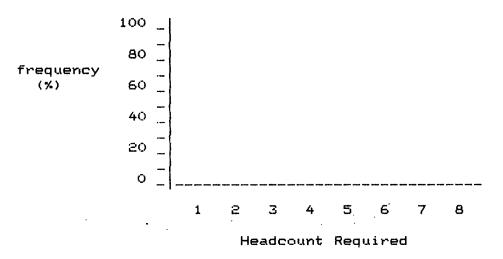   1.95.

     <ESC>   Returns the user to screen 1.92.

Display a table of maintenance manhour requirements

MAINTENANCE HEADCOUNT REQUIREMENTS

MOS/Skill: 63D20

```
            100 _|
                 |_
             80 _|
                 |_
frequency        |_
   (%)       60 _|
                 |_
             40 _|
                 |_
             20 _|
                 |_
              0 _|_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
                     1   2   3   4   5   6   7   8
```

Headcount Required

Screen 1.93 -   Maintenance Headcount Requirements histogram with
                      menu bar commands displayed.

Screen 1.95 - Print Headcount Histogram(s) menu.

From this screen, the user can choose to print the
currently displayed histogram or all headcount
histograms.

User Actions:

1.   For this job only - Prints only the currently
      displayed histogram. Next screen is 1.97.

2.   For all maintenance jobs - Will print a headcount
      histogram for all maintenance jobs for the current
      system. Next screen is 1.96.

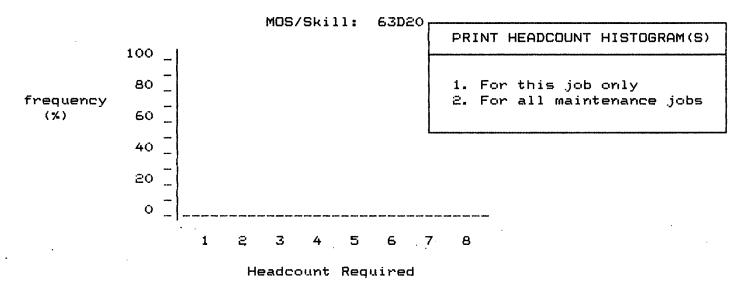<ESC> Returns the user to screen 1.93.

MAINTENANCE HEADCOUNT REQUIREMENTS

MOS/Skill: 63D20

```
                           |  PRINT HEADCOUNT HISTOGRAM(S)  |
                           |                                |
         100 _             |                                |
             -             |  1.  For this job only         |
          80 _             |  2.  For all maintenance jobs  |
frequency    -             |                                |
   (%)    60 _             |_____|
             -
          40 _
             -
          20 _
             -
           0 _|_____
              |  
              1   2   3   4   5   6   7   8

                    Headcount Required
```

Screen 1.95 -   Print Headcount Histogram(s) menu.

Screen 1.96 -   Maintenance Headcount Requirements print
                message.

        This is an informational message informing the user of
        how many histograms there are to print and the
        estimated completion time.

        User Actions:
        None.   Next screen is 1.97.

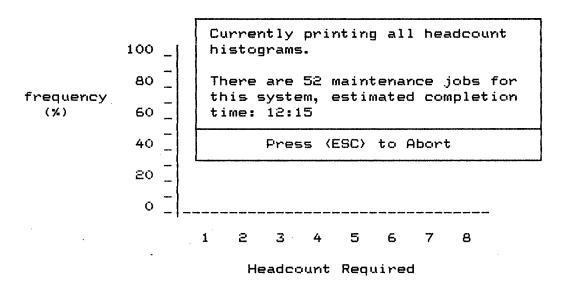   <ESC> Aborts the printing job.   Next screen is 1.96A??.

MAINTENANCE HEADCOUNT REQUIREMENTS

```
              100 _|  Currently printing all headcount
                  -   histograms.
               80 _
 frequency        -   There are 52 maintenance jobs for
   (%)         60 _   this system,  estimated completion
                  -   time: 12:15
               40 _
                  -        Press <ESC> to Abort
               20 _
                  -
                0 _|_____

                   1   2   3   4   5   6   7   8

                        Headcount Required
```

Screen 1.96 -   Maintenance Headcount Requirements print message.
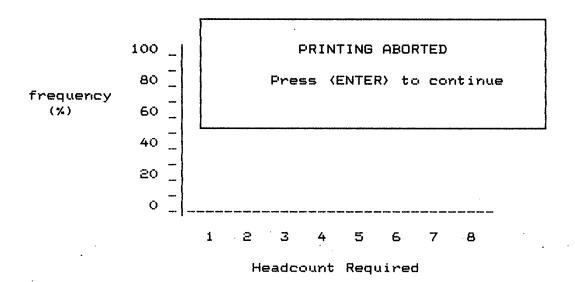
Screen 1.96A - Print Job Aborted message.

Informs the user that the printing of all Maintenance
Headcount Requirements histograms was aborted.

<u>User Actions:</u>
<ENTER> Returns the user to screen 1.93.

MAINTENANCE HEADCOUNT REQUIREMENTS

```
              100 _ |  ┌──────────────────────────────────────┐
                    |  │                                      │
               80 _ |  │         PRINTING ABORTED             │
frequency           |  │                                      │
   (%)         60 _ |  │     Press <ENTER> to continue        │
                    |  │                                      │
               40 _ |  └──────────────────────────────────────┘
                    |
               20 _ |
                    |
                0 _ |_____

                    1   2   3   4   5   6   7   8

                         Headcount  Required
```

Screen 1.96A -   Print Job Aborted message.

Screen 1.99 - Sort Maintenance Manhour Data menu.

From this screen, the user can choose a category by which to sort maintenance manhour data.

<u>User Actions:</u>
1.   Maintenance Job - Sorts and displays maintenance manhour requirements by maintenance job. Next screen is 1.100.

2.   Functional System - Sorts and displays maintenance manhour requirements by Functional System. Next screen is 1.100.

3.   Maintenance Organization - Sorts and displays maintenance manhour requirements by maintenance organization. Next screen is 1.100.

4.   Maintenance Type - Sorts and displays maintenance manhour requirements by maintenance type. Next screen is 1.100.

<ESC> Returns the user to screen 1.91.

Display maintenance manhour requirements by selected categories

		MAINTENANCE MANHOUR REQUIREMENTS				
Job (MOS/Skill)	Main Ac	SORT MAINTENANCE MANHOUR DATA BY:			Type	Total Manhours
63D10	repl	1. Maintenance Job (MOS/Skill)			C	21.2
	repa	2. Functional System			C	28.0
	repa	3. Maintenance Organization				
		4. Maintenance Type			C	12.2
	insp					9.5
	insp				P	17.0
	remove/					
	replace	Seals, main	1	gs	C	12.5
subtotals			* 62			* 100.4
63D20	repair	Rod, connecting	2	ds	C	10.5
	remove/					
	replace	Crankshaft	1	ds	C	13.0
	repair	Engine mount	3	ds	C	9.5
	inspect	Engine mount	27	gs	P	13.5

Screen 1.99 -   Sort Maintenance Manhour Data menu.

3-309

Screen 1.100 - Maintenance Manhour Requirements with "SORT
OPERATION IN PROGRESS" message displayed.

User Actions:

None. The next screen 1.101 is an example of a
Maintenance Manhour Requirements report sorted by
Maintenance Organization.

Display maintenance manhour requirements by selected categories

	MAINTENANCE MANHOUR REQUIREMENTS					
Job (MOS/Skill)	Maintenance Action	Component Name	#	Org	Type	Total Manhours
63D10	replace				C	21.2
	repair				C	28.0
	repair	SORT OPERATION IN PROGRESS			C	12.2
	inspect					9.5
	inspect	Crankshaft	38	gs	P	17.0
	remove/ replace	Seals, main	1	gs	C	12.5
subtotals			* 62			* 100.4
63D20	repair	Rod, connecting	2	ds	C	10.5
	remove/ replace	Crankshaft	1	ds	C	13.0
	repair	Engine mount	3	ds	C	9.5
	inspect	Engine mount	27	gs	P	13.5

Screen 1.100 -   Maintenance Manhour Requirements with "SORT

Screen 1.101 - Maintenance Manhour Requirements report
                sorted and displayed by Maintenance
                Organization.

    User Actions:

    The user actions from this screen are the same as those
    for step 1.90.

MAINTENANCE MANHOUR REQUIREMENTS						
Org	Job (MOS/Skill)	Maintenance Action	Component Name	#	Type	Total Manhours
ds	63D10	replace	Cylinder head	3	C	21.2
	63D20	repair	Rod, connecting	2	C	28.0
		remove/			C	12.2
		replace	Crankshaft	1		13.0
		repair	Engine mount	3	C	9.5
		inspect	Engine mount	27	P	13.5
		replace	Seals, main	1	C	12.5
	subtotals			* 37		* 109.9
gs	63D20	repair	Master Cylinder	1	C	12.2
		inspect	Fuel Injection	12	P	9.5
		inspect	Crankshaft	38	P	17.0

Screen 1.101 -   Maintenance Manhour Requirements report sorted and displayed by Maintenance Organization.

Screen 1.103 - Print Maintenance Manhour Requirements menu.

From this screen, the user can choose to print only the
information that is currently displayed on the screen,
all of the information for the category highlighted in
the left most column, or all of the information for the
entire system.

User Actions:
1.   This page only - Prints only the information
     displayed on the screen. Next screen is 1.104.

2.   All requirements for the highlighted job - Prints
     all information for the category highlighted in
     the left column even if it extends beyond the
     current screen. Next screen is 1.104.

3.   All requirements for the entire system - Prints
     all of the Maintenance Manhour Requirements. Next
     screen is 1.104.

<ESC> Returns the user to screen 1.91.

    Headcount   Sort   Print
Print all or selected portions of the Maintenance Manhour Requirements table

Job (MOS/Skill)	Ma	PRINT MAINTENANCE MANHOUR REQUIREMENTS				Total Manhours
		1. This page only				
63D10	re	2. All requirements for the highlighted job				21.2
	re	3. All requirements for the entire system				28.0
	re					
						12.2
	inspect	Fuel Injection	12			9.5
	inspect	Crankshaft	38	gs	P	17.0
	remove/					
	replace	Seals, main	1	gs	C	12.5
subtotals			* 62			* 100.4
63D20	repair	Rod, connecting	2	ds	C	10.5
	remove/					
	replace	Crankshaft	1	ds	C	13.0
	repair	Engine mount	3	ds	C	9.5
	inspect	Engine mount	27	gs	P	13.5

Screen 1.103 -   Print Maintenance Manhour Requirements menu.

Screen 1.104 - Maintenance Manhour Requirements menu with
the "PRINTING" message displayed.

User Actions:

None.   Next Screen is 1.105.

<ESC>   Aborts the print request. Returns the user
to screen 1.91.

   Headcount   Sort   Print
Print all or selected portions of the Maintenance Manhour Requirements table

MAINTENANCE MANHOUR REQUIREMENTS						
Job (MOS/Skill)	Maintenance Action	Component Name	#	Org	Type	Total Manhours
63D10	replace	C		ds	C	21.2
	repair	F		gs	C	28.0
	repair	M PRINTING		gs	C	12.2
		C				
	inspect	F				9.5
	inspect	C <ESC> to Abort		gs	P	17.0
	remove/					
	replace	Seals, main	1	gs	C	12.5
subtotals			* 62			* 100.4
63D20	repair	Rod, connecting	2	ds	C	10.5
	remove/					
	replace	Crankshaft	1	ds	C	13.0
	repair	Engine mount	3	ds	C	9.5
	inspect	Engine mount	27	gs	P	13.5

Screen 1.104 -   Maintenance Manhour Requirements menu with the
                   "PRINTING" message displayed.

Screen 1.105 - Maintenance Manhour Requirements menu with "PRINTING COMPLETE" message displayed.

<u>User Actions:</u>
<ENTER> Next screen is 1.91.

MAINTENANCE MANHOUR REQUIREMENTS						
Job (MOS/Skill)	Maintenance Action	Component Name	#	Org	Type	Total Manhours
63D10	replace	C			C	21.2
	repair	F			C	28.0
	repair	M				
		C			C	12.2
	inspect	F				9.5
	inspect	C			P	17.0
	remove/					
	replace	Seals, main	1	gs	C	12.5
subtotals			* 62			* 100.4
63D20	repair	Rod, connecting	2	ds	C	10.5
	remove/					
	replace	Crankshaft	1	ds	C	13.0
	repair	Engine mount	3	ds	C	9.5
	inspect	Engine mount	27	gs	P	13.5

Within the table, a message box is displayed:

```
PRINTING COMPLETE

Press <ENTER> to continue
```

Screen 1.105 -   Maintenance Manhour Requirements menu with
                  "PRINTING COMPLETE" message displayed.

Screen 1.106 - System Availability Estimates report.

    <u>User Actions:</u>

P   Prints the report. Next screen is 1.89.

<ENTER>   Returns the user to screen 1.89.

<ESC>   Returns the user to screen 1.89.

```
+-----------------------------------------------------------+
|              SYSTEM AVAILABILITY REPORT                   |
+-----------------------------------------------------------+
|                                                           |
|   Mission:  Transport Combat Troops                       |
|   Maintenance Scenario file: TRANS01                      |
|   System Name:  UH-60 Black Hawk                          |
|                                                           |
+-----------------------------------------------------------+
|                                                           |
|   Mean Time Between Component Failures:      708.8        |
|   Mean Time to Repair:                        11.5        |
|                                                           |
|   Inherent Availability:                     98.4%        |
|                                                           |
+-----------------------------------------------------------+
| Press <P> to print        Press <ENTER> to continue       |
+-----------------------------------------------------------+
```

Screen 1.106 -   System Availability Estimates report.

Screen 1.107 - System Reliability Estimates report.

User Actions:

P   Prints the report.   Next screen is 1.89.

<ENTER>   Returns the user to screen 1.89.

<ESC>   Returns the user to screen 1.89.

```
+-------------------------------------------------------------------------+
|                     SYSTEM RELIABILITY REPORT                           |
+-------------------------------------------------------------------------+
|  Mission:  Transport Combat Troops                                      |
|  Maintenance Scenario file: TRANS01                                     |
|  System Name:  UH-60 Black Hawk                                         |
+----------------------------------+--------------------------------------+
|      MISSION RELIABILITY         |   EQUIPMENT GROUP RELIABILITY/MISSION |
+----------------------------------+--------------------------------------+
|                                  |                                      |
|  Missions Started:  1515         |   Armament:  94%                     |
|                                  |                                      |
|  Missions Completed:  1457       |   Mobility Group:  89%               |
|                                  |                                      |
|  Missions Aborted:  58           |   Communications Group:  96%         |
|                                  |                                      |
|  Reliability:  96%               |   Total System:  80.3%               |
|                                  |                                      |
+----------------------------------+--------------------------------------+
|  Press (P) to print                   Press (ENTER) to continue         |
+-------------------------------------------------------------------------+
```

Screen 1.107 -   System Reliability Estimates report.

Screen 1.108 - Simulation Errors report.

    <u>User Actions:</u>

    P   Prints the report. Next screen is 1.89.

    <ENTER>   Returns the user to screen 1.89.

    <ESC>   Returns the user to screen 1.89.

```
┌─────────────────────────────────────────────────────────────────────┐
│                     SIMULATION ERRORS FILE                           │
├─────────────────────────────────────────────────────────────────────┤
│  System Name:   UH-60 Black Hawk                                      │
│  Maintenance Scenario file:   TRANS01          Errors Encountered: 1  │
├─────────────────────────────────────────────────────────────────────┤
│                                                                       │
│  Functional System:   Engine                                         │
│  Message:   Missing (MOUBF) for (repair) (connecting rod)            │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘
```

Screen 1.108 -   Simulation Errors report.

3.5.8 STEP 8 - Investigate potential solutions to maintenance deficiencies by modifying Component Maintenance Parameters and re-running the Maintenance Requirements Simulation Model.

3.5.8.1   Input

<u>External:</u> The contractor's design engineers, subject matter experts, analyst judgement.

<u>Internal:</u> Maintenance workload deficiencies in the system that were identified in Step 7.

3.5.8.2   Process

When the results of the Maintenance Requirements Simulation Model indicate that the manpower required to maintain the system under evaluation exceeds the manpower constraints that were identified in the Product 2 MCEA analysis or that the system availability/reliability estimates are deficient when compared to the requirements obtained from the Product 1 SPREA analysis, the analyst can use the MMAA to investigate potential solutions to the design deficiencies. The analyst can use the MMAA as a tool to estimate the effects of changes in the Component Maintenance Parameters on maintenance workload by modifying one or more parameters and re-executing the simulation model. For example, if the contractor can increase the mean time between failure for a particular component or functional system by 10%, what impact would such a change have on the system availability or reliability? This information could be presented to the contractor for potential resolution of the deficiency.

3.5.8.3 Outputs

The outputs of this Step are simulation results files that represent potential solutions to maintenance requirements deficiencies. These results files will also be available as input to the analysis aided by Product 6.

3.5.8.4 User Interface

Since the execution of this step only involves re-application of the MMAA with potentially different input data to investigate potential changes in maintenance requirements, no additional software is required.